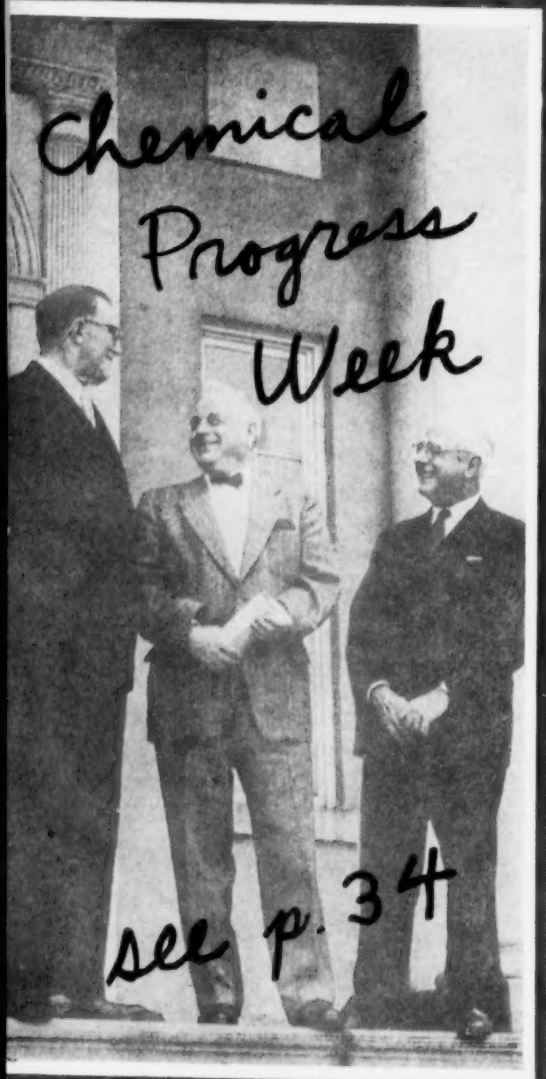
C W Report

Chemical Week

May 21, 1955

Price 35 cents



Operations research can't make up an executive's mind, but it can give him needed data . . . p. 42

Lately respectable and now chic, hair tints are a multimillion-dollar specialties line . . . p. 68

Philosophy behind new research laboratory: it can pay to buck popular trends . . . . . p. 78

Foreign countries use more of their own chemicals, export less to U.S.; here's a rundown . . p. 86

Reviving markets sail acrylic fibers out of the doldrums; new outlets also add a

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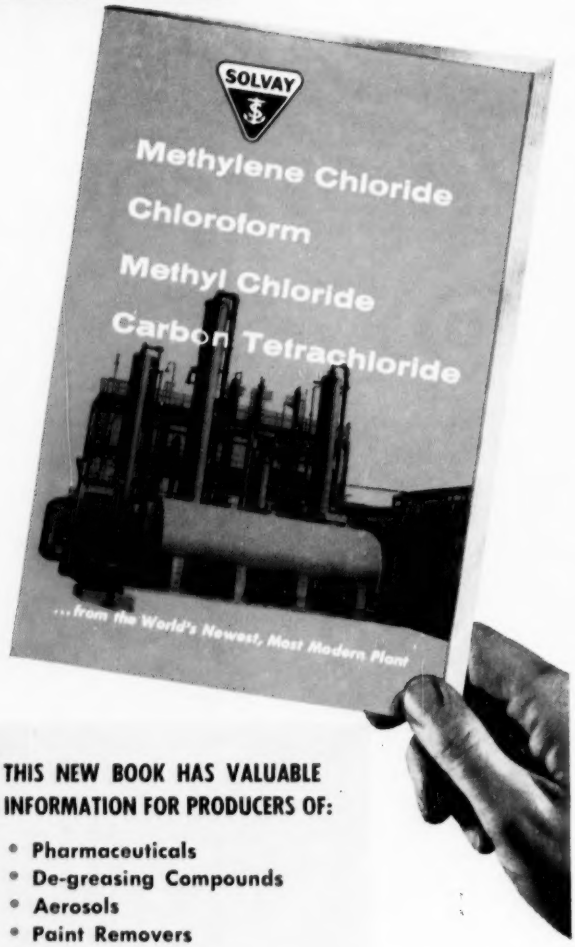
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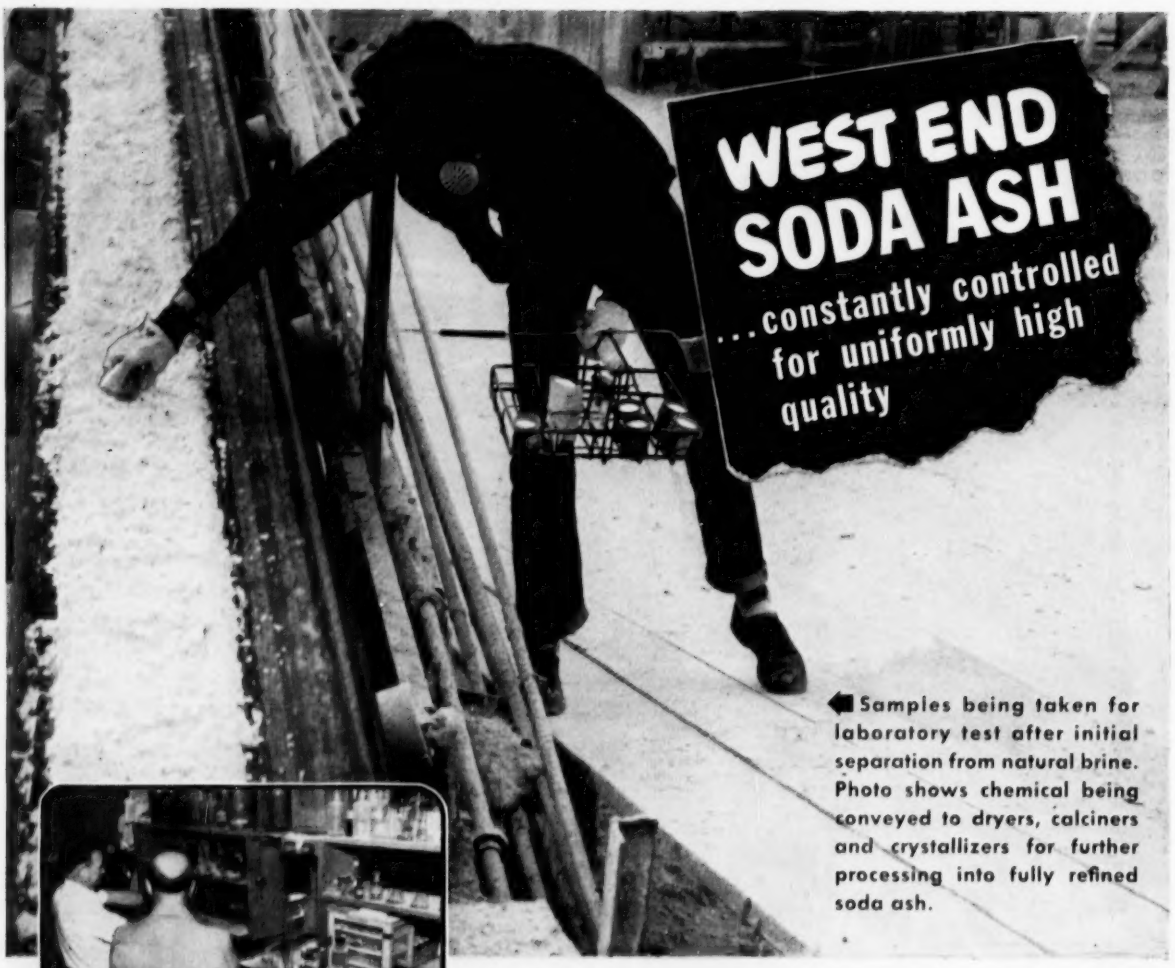
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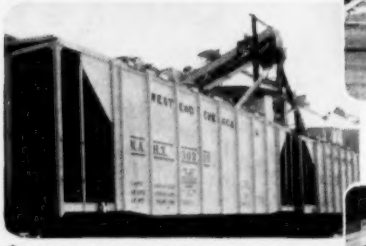
◀ Samples being taken for laboratory test after initial separation from natural brine. Photo shows chemical being conveyed to dryers, calciners and crystallizers for further processing into fully refined soda ash.

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Volume 76 — May 21, 1955 — Number 21

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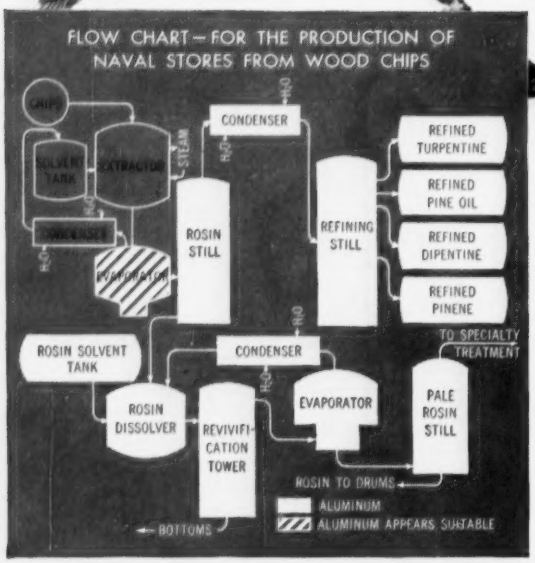
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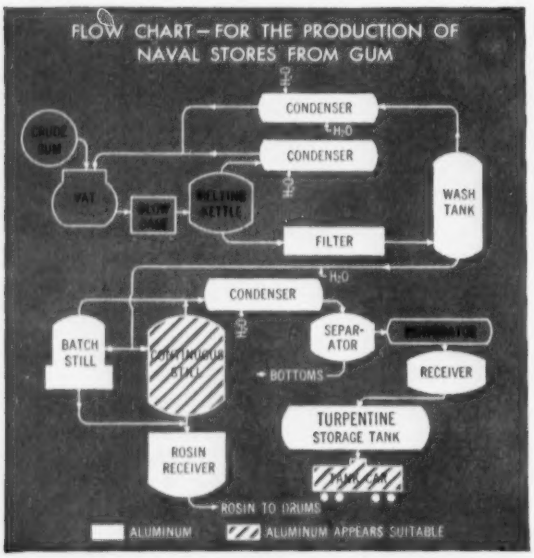
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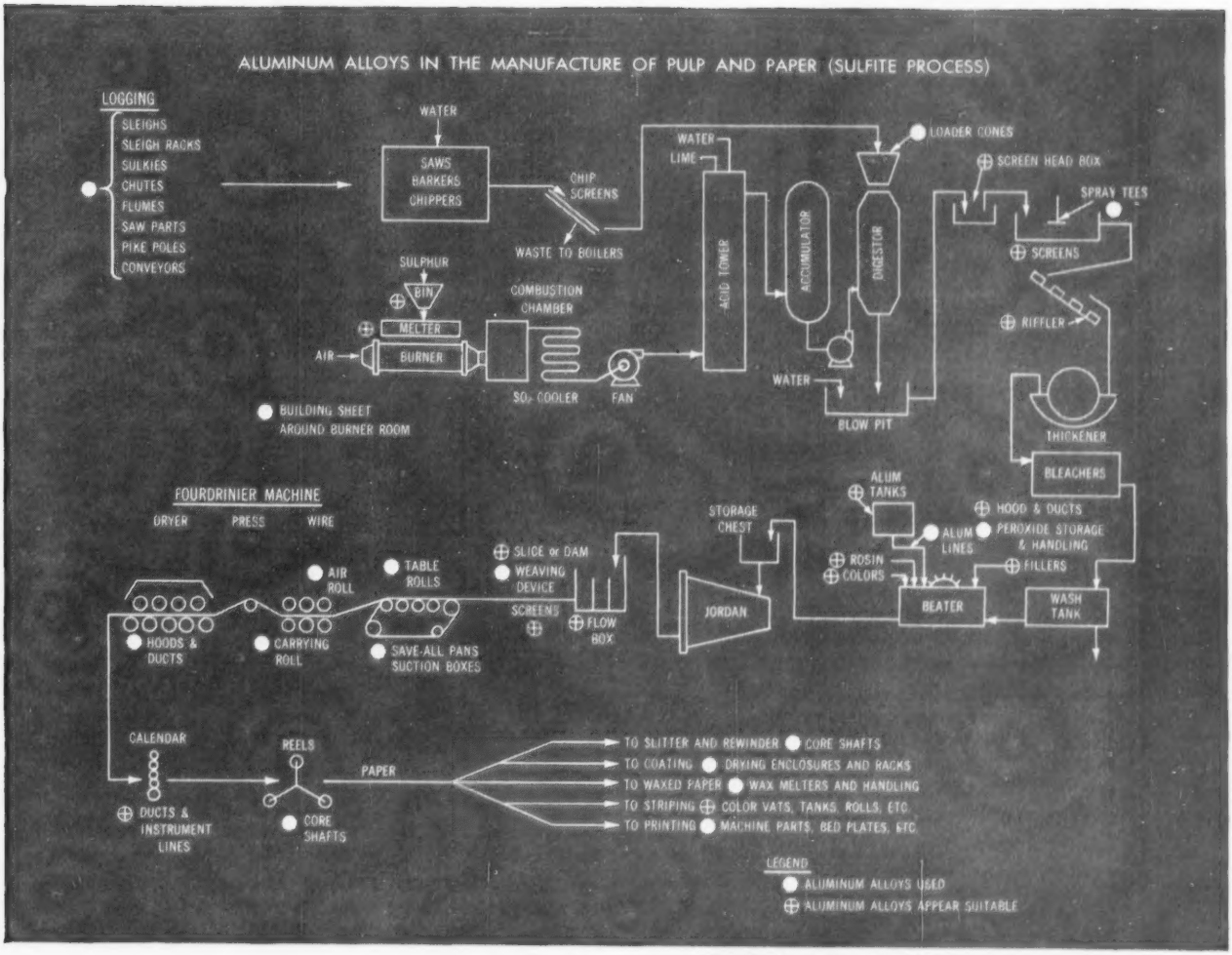
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OPINION . . . . . .

Let's Act Our Stature

"The greatest story NEVER told." That's an accusation that has been leveled at the chemical industries; and in a good many respects it's well justified. Our industry—vital, powerful, prosperous as it is—has had, as an industry, a woefully puny public voice. Chemical producers, who are progressive and foresighted in virtually every other way, have, strangely enough, not seen fit to invest through their industry associations (MCA and SOCMA) sufficient funds to implement a public relations program that even approaches adequate stature.

This is not to disparage, of course, what individual companies have done—albeit mainly on their own behalf; nor is it to minimize the zeal with which corporations have supported Chemical Progress Week; nor is it to disparage what both the MCA and SOCMA have accomplished in the production of informational literature (*Facts for Industry, This Chemical World*, etc.). But the budget has been relatively minuscule.

Moreover, the industry has neglected one of the most important ways to tell its complex but innately interesting and inspiring story to the public: films for TV.* Look at the American Petroleum Institute, for example, which has about $1 million invested in its film program (it has made five major films). The MCA budget, by comparison, crowds zero.

As of this week, the industry has one feature film—*one* industry film—available. And it's a good one. But the fact that the movie was produced must be credited not to the chemical industry as a whole, but to a relatively small group of companies and a handful of energetic men.

Last December a Film Committee of the Chemical Industry was set up, spearheaded by Allied Chemical's Larry Bogart. The group elicited financial support from a half-dozen companies (Allied, Carbide, Celanese, Cyanamid, Monsanto and Shell). It reviewed 84 company-produced films (total footage: 124,000 ft.), selected scenes, spliced, and wrote the script for the 1,100-ft. *"A Better Tomorrow."* (Cost, because of the cooperation of the companies who supplied their films and the diligence of the committee, was below $10,000. Under normal circumstances such a film would have cost five to six times that figure.)

Prints of the movie are now available (color: $165; black and white, $80). Some chemical concerns are already arranging to give prints to local schools and chambers of commerce; others are using it in conjunction with plant visits, arranging for its presentation on local TV stations, showing it to church and civic groups. Every chemical company, large or small, **should, in our opinion, consider doing** likewise—in its own interest and in the interest of our industry.

We commend the committee and the participating companies for the project they started and for the fine work they have done.

But this is only one film—and one film produced under trying circumstances. More are needed. The chemical industry story must not be told just once a year; it must be a continuing effort. And that requires money—an allocation of sufficient funds, via the MCA, to portray adequately the stature, character and contributions of our industry.

W. Alec Jordan
Editor

* The MCA has just issued one 4½-minute film "Chemicals are Fashionable," plans three other shorts. Total budget: $4,000.

DATES AHEAD . . .

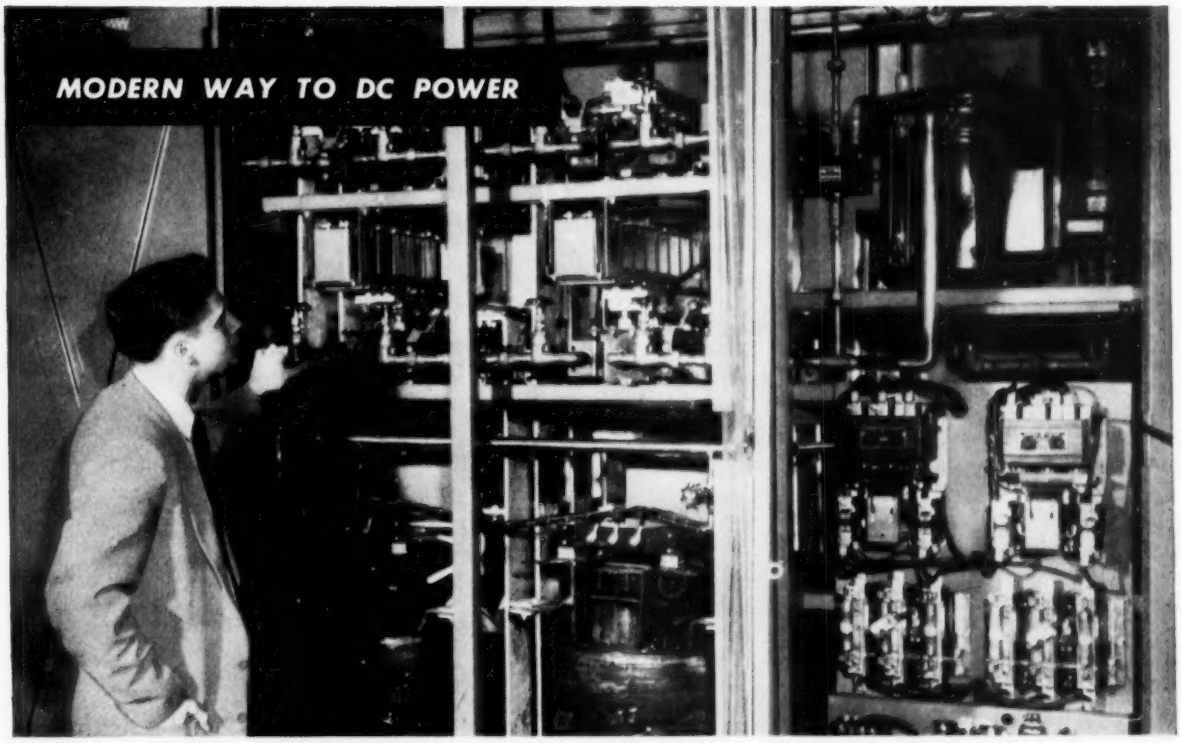
American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, June 26-July 1.

Chemical Institute of Canada, annual conference and exhibition, Quebec City, May 30-June 1.

Synthetic Organic Chemical Manufacturers Assn., annual outing in conjunction with MCA, Greenbrier Hotel, White Sulphur Springs, W. Va., June 10-11.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: W. A. Jordan, Chemical Week, 330 W. 42nd St., New York 36, N. Y.



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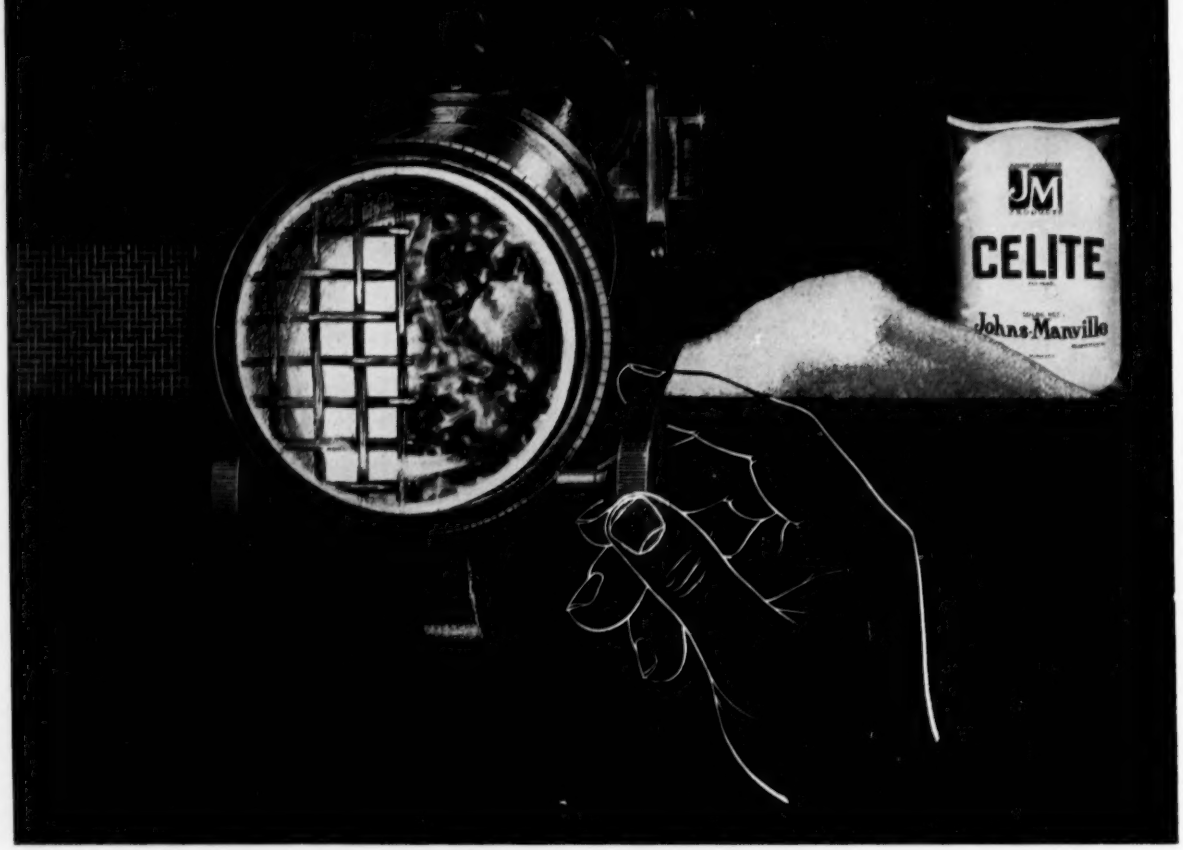
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NEWSLETTER

Things are seldom as black as they look. Government analysts now evaluating the fine print of the Foreign Trade bill believe that its practical effect upon the U.S. tariff level will be negligible.

True, some tariffs in the higher brackets (including some chemicals) theoretically could be sharply reduced under the new tariff-cutting authority granted the President. But in practice, most of them are "politically sensitive" items that the Administration will be reluctant to touch—particularly in view of the strong protectionist sentiment reflected in the Congressional battle over H.R. 1.

Four classes of chemical imports, however, will be immediately subject to drastic tariff cuts under the provision of the new law which authorizes reducing any tariff to 50% ad valorem. They are: diethylbarbituric acid, salts and compounds, carrying 250% ad valorem equivalent tariff; cellulose waste, with a 163.6% duty; synthetic tanning materials, with a 68.9% tariff; and magnesium oxide, with a 62.3% rate.

Last year's imports of all four were negligible, though; about $6,000 worth of synthetic tanning agents was brought into the U.S., while imports of each of the others were under $500.

•

A similar ray of light has appeared in the Columbia River Basin area where 14 Pacific Northwest plants have been struggling with cut-back supplies of interruptible energy from hydro plants. Spring run-offs are now under way, and, with dams filling, all loads can now be met with little or no help from steam plants. At the same time, higher spring temperatures are further easing the drain on the region's electric systems as domestic loads start to drop. Outlook for chemical production in the area this summer: fair to good.

•

"Multiple taxation" on chemical products is a threat posed by one of the many tax bills now pending before various state legislatures (*see p. 18*).

Appearing before a legislative tax committee in Austin, Harry Whitworth of the Texas Chemical Council warned that the proposed gross receipts tax on chemicals would result in "pyramiding" taxation. By way of example, he said that certain Texas-made rubber chemicals would be taxed three times in as many plants on their way to their end-use plant, and then would be taxed a fourth time as tires.

•

Repeal of fluoridation of municipal water supplies seems to have been averted again in a referendum this spring in Palo Alto, one of the two California communities (out of a possible ten) to vote fluoridation "in" last November. The "anti's" carried on their usual propaganda campaign, calling fluorides "rat poison" and the "waste of the aluminum and chemical industries"; the "pro's" counteracted by pointing out that their opponents were attempting to pull off an old-time dodge in reopening the issue for vote. How? In Palo Alto (as in San Diego, where fluoridation was defeated) the wording of the second ballot was tricky—a "yes" vote was actually a vote against fluoridation.

Moving day again for a number of chemical firms. Along with word of the formation of a new division of W. R. Grace (*see p. 16*) comes the news that Grace Chemical will pick up its headquarters and head for Memphis.

Jefferson Chemical is also reported to be pulling up stakes in New York. Destination: somewhere in the southwest—likely Houston.

•

The U.S. Bureau of Mines' electro-metallurgical laboratory at Albany, Ore., has stopped producing zirconium for the Atomic Energy Commission in line with the government's policy of getting out of commercial operations when private industries are prepared to take over. Due to take up the slack in production of the metal: Carborundum Metals Co., Akron, O.

Large-scale output at the U.S. lab (until lately the only U.S. source of zirconium) started in 1949; total production at one time reached 1.25 million lbs./year. Carborundum's capacity is only half of that, but it's enough, experts say, to meet immediate national needs.

•

Last week, another spate of chemical fast tax write-offs. Among them: Columbia-Southern, Saltville, W. Va., for titanium tetrachloride, $5.5 million at 90%; Ethyl Corp., Baton Rouge, La., for ethyl chloride, $4 million at 100%; Hidalgo Chemical (formerly Carthage Hydrocol), Port Brownsville, Tex., for the addition of a synthesis gas generator and catalyst activation facilities, $3.4 million at 70%.

•

On the docket for early Senate Judiciary Committee consideration: what's causing delays in the U.S. Patent Office? A $50,000 fund has been appropriated to see how issuance of patents and trademarks can be speeded.

•

Latest in the Boston book ban: at a hearing June 15 in state superior court, attorneys will debate whether the discoverer of a pharmaceutical product can restrain a hostile critic from publishing a book "panning" the preparation and its inventor.

Last month, Steven Durovic—refugee Yugoslavian physician who has been living in Chicago—got a temporary restraining order to keep a Boston printer from publishing a book to be called "Krebiozen, the Great Cancer Mystery" (*CW, April 23, p. 15*). And last week at a preliminary hearing, the printer's attorney put in the record a demurrer asking for dismissal of the suit. His argument: any discussion of making the injunction permanent would be a violation of the "free press" amendment to the Constitution. Durovic charges that the title originally planned for the book was "The Great Cancer Hoax."

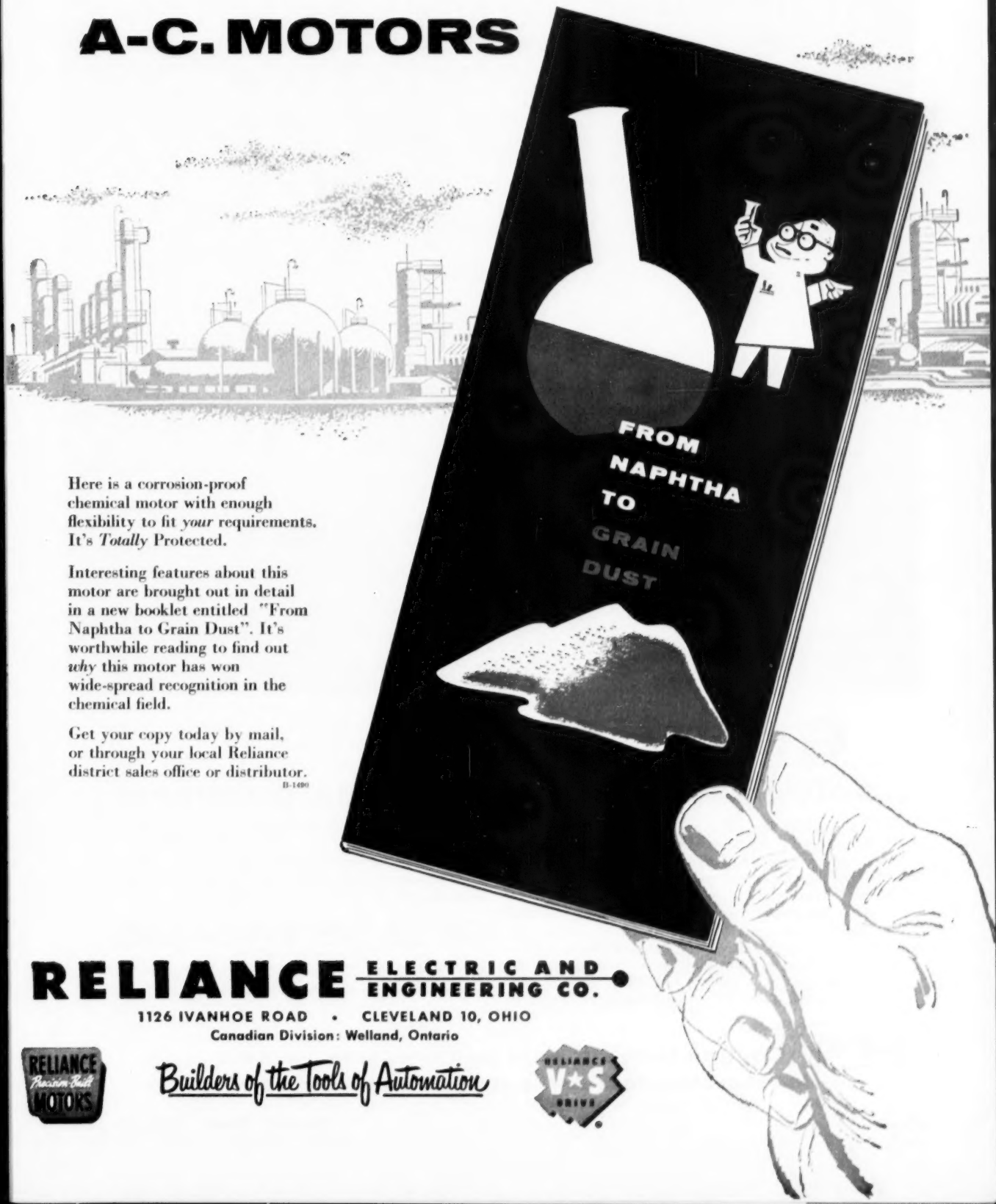
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For would-be uranium prospectors, there's word this week from two University of Wyoming professors on development of a pocket-size prospecting kit designed to retail for less than $10.

The kit, its backers claim, will enable any adventure-bound American to detect uranium-bearing ore and determine—right on the spot—whether it has commercial value. Heart of the matter: a "Urani-Tector," which causes uranium ore to glow in "invisible rays filtered from regular sunlight," and a chemical kit to assay the find.

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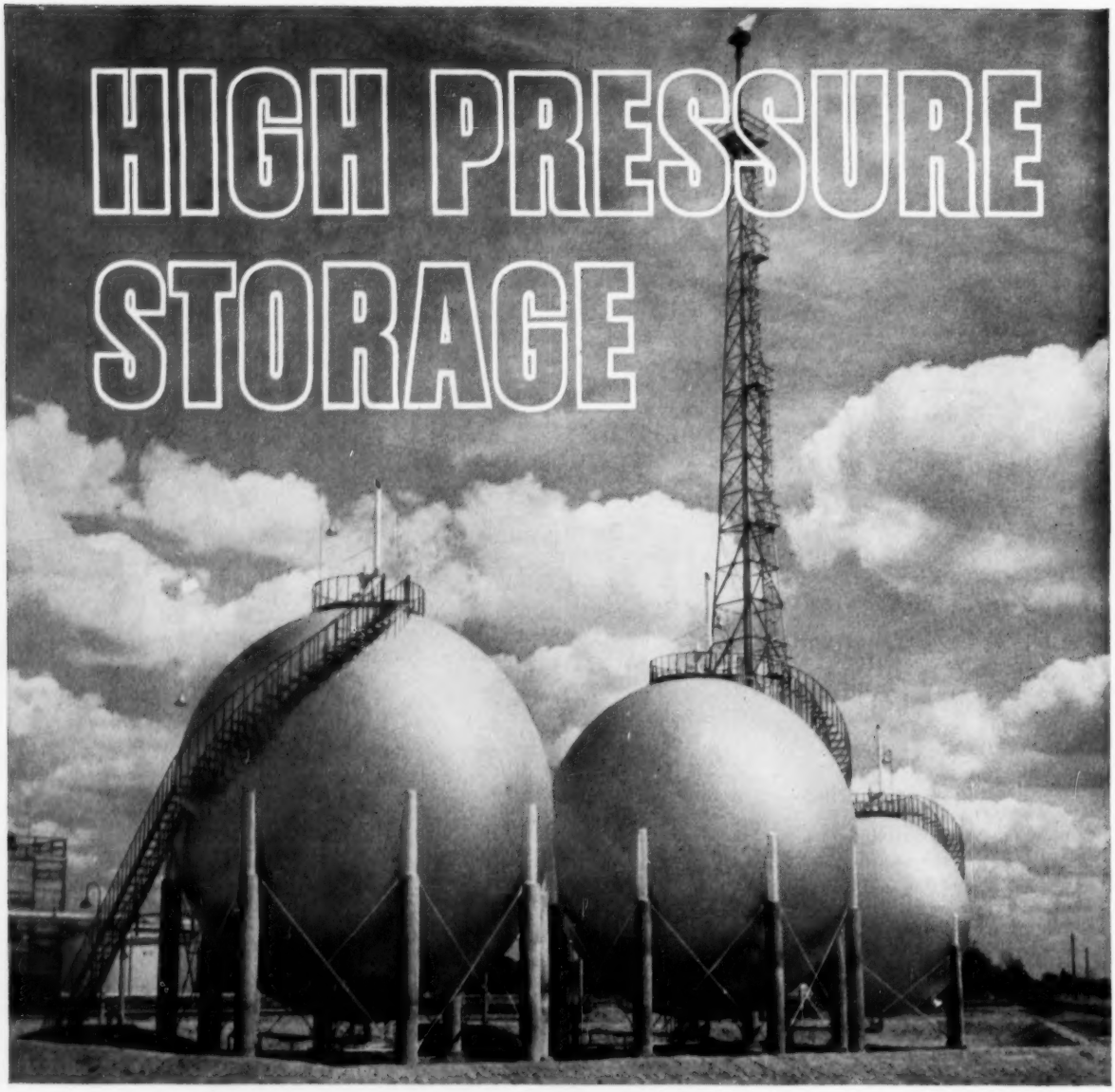
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BUSINESS & INDUSTRY . . .



WIDE WORLD

SALK, SCHEELE: For inventor and manufacturers, new vote of confidence.

Going, Going, Gone: Doubts on Vaccine

Batch-by-batch, shipments of Salk polio vaccine are being recleared for use; and each lot that qualifies for "super" certification regains for the manufacturers much of the public confidence that had been shaken by rumors and suspension orders.

By this week, vaccinations were being resumed throughout the nation as the Public Health Service's Laboratory of Biologics Control put its second o.k. on vaccine batches that had been held in cold storage in many states pending this double check. The plant-by-plant inspections by the three-man team headed by Dr. William Workman, chief of that laboratory, are amounting to virtual "exoneration" of the industry and the vaccine.

Also bolstering confidence in the vaccine and the people who have been working on it:

• An unequivocal statement by PHS Surgeon General Leonard Scheele expressing his continued belief that the Salk vaccine is fundamentally safe and "an invaluable contribution to public health."

• Announcement by Parke, Davis & Co.'s Executive Vice-President Homer Fritsch that his company will begin immediate construction of a $1-million addition to its laboratories at Rochester, Mich., permitting P-D to double output of the vaccine within four months.

'Lucky' 13th: For producers and scientists who had a stake in the Salk vaccine, the turning point in their nearly three-week string of bad breaks came last Friday (the 13th). Morning newspapers that day reported that PHS officials expected still another delay in the vaccination program; but such gloomy predictions vanished as Scheele testified that morning and afternoon before the House Banking Committee headed by Rep. Brent Spence (D., Ky.).

Scheele not only reiterated his complete confidence in the vaccine itself, but also told the congressmen that batches of Parke, Davis vaccine probably would get full clearance within a few hours. That clearance came promptly, and a green light on Eli Lilly's vaccine came two days later. Next to be inspected: Pitman-Moore, Wyeth, and Sharp & Dohme.

Vaccine produced by Cutter Laboratories remains on the sidelines, but Scheele told Spence's committee that Cutter's production methods and testing procedures have been rechecked and found correct. He added that testing of Cutter vaccine has been scheduled at 17 laboratories in the U.S.; these laboratories will be given small numbered containers of Cutter vaccine and "control" samples from other sources, and only PHS will know which samples are which. It's hoped that this will clear up any question about safety and efficacy of the Cutter product.

Controversy Rolls On: Resumption of vaccinations, however, hasn't halted the controversy over the role of government in the program.

This week, Health-Education-Welfare Secretary Oveta Culp Hobby told about her cooperative allocation program: after completing their contracts with the National Foundation for Infantile Paralysis, all vaccine producers have agreed to make shipments as recommended by the H-E-W Dept. Mrs. Hobby is asking Congress for extra funds for testing, policing, and free shots.

Strike Forces Closure

Closing of its warehousing plant that served 60 hospitals and 700 retail outlets in Newark, N.J., and vicinity has been blamed by McKesson & Robbins on the bargaining demands of one unit within the 200-man plant force.

M&R had signed a contract with the AFL Office Employees Union granting to about 130 of the plant workers a 7½¢/hour wage increase now and another 5¢ rise next year; but the other employees—represented by the AFL's Teamsters & Warehousemen – asked for higher wage hikes and certain changes in seniority rules. An M&R spokesman said those demands "made it impossible to operate with efficiency and economy."

The company told its customers in the area that it regretted it was no longer able to serve them. Permanent closing was decided on after a seven-week strike.



POLYSTYRENE UNITS: Will be ready for production early next year.

First of a Series?

When word was released last week that Monsanto Chemical Co. (St. Louis) had received formal Argentine government approval to build a polystyrene plant outside Buenos Aires, industry observers were wondering whether the permission would signal a rush of other applications to build plants in the Argentine.

Numbers of U.S. firms have been reported to be eyeing the rapidly growing Argentine plastics molding industry eagerly, but up to now the South American Republic has been chary of foreign penetration into its market. Even the approval granted to Monsanto seems to have been conditioned in a number of ways. Spokesmen say plant construction (due for completion early next year) will be financed with funds raised in Argentina; Monsanto's contribution will be limited to machinery, equipment, spare parts, raw materials, and "know-how."

To handle the polystyrene-producing plant, Monsanto has set up a new company—Monsanto Argentina, S.I.A.C.—which, for organizational reasons, will be owned by Monsanto's Panamanian subsidiary, Monsanto Overseas, S.A.

Gains Are Obvious: What Monsanto has to gain in building a plant in Argentina is immediately obvious. There is no plant in that country today turning out polystyrene; the plastics molding industry is one of the fastest-growing sectors of Argentine economy.

Further: international competition to gain a toe-hold in the Argentine plastics industry has been fierce in recent years. The company that gets "in" first is sure to have a big jump on the field.

Simpler Customs?

For chemical industry spokesmen, another mission to Washington is in the offing for next week, when the House Ways & Means Committee will take up a new version of the customs simplification bill that didn't make the grade last year.

Like the tariff bill (H.R. 1) that has been passed by both the House and the Senate and is now being polished up by a joint committee, this customs bill (H.R. 6040) is sponsored by Rep. Jere Cooper (D., Tenn.), 26-year Congressional veteran who is chairman of the Ways & Means Committee. The two bills have one other feature in common: they both would make for lower duties on goods imported into the U.S.

The over-all effect of H.R. 6040 on U.S. tariff levels will be relatively slight, but some classes of chemical imports will be more affected than most other commodities. And the way in which those chemical duties would be reduced is what's likely to induce domestic producers to send representatives to Washington for next week's hearings.

Change in Valuations: Key provision of the bill would change the preferred basis of evaluating imports for duty assessment to "export value" (actual cost of a product to the exporter) instead of "foreign value" (price of the item in its home market). When it's necessary to use "U.S. value," customs appraisers would be required to include actual commissions, profits and other factors. Object of the proposed change: to reduce delays and uncertainties of customs appraisal, "foreign value" being difficult to determine.

While a Customs Bureau study shows that total dutiable value on all imports would be cut only 2.5% and customs revenue 2% by this measure, it's a different story on some chemical products. Cuts in value would be 1.32% for dyeing and tanning materials, 6.83% for synthetic fibers, 3.69% for coal-tar products, 1.36% for pharmaceuticals, 7.09% for industrial chemicals, 10.26% for soap and toilet preparations, and 11.62% for pigments, paints and varnishes. Duties would be trimmed by 1.2% on coal-tar products, 0.8% on industrial chemicals, 1.9% on synthetic fibers, 1.5% on paints and varnishes, and 1.7% on soaps and toilet articles.

There'll be stubborn protectionist opposition in Congress, but with support from President Eisenhower and the Democratic leaders, the outlook now is that Cooper's new bill will pass without crippling amendments.



WIDE WORLD

REP. COOPER: On some chemical imports, lower duty looms.

Decree on Drums

If you put up any of your products in steel drum containers, you'll want to check with your supplier on the effects of a cease-and-desist order issued last week to five major steel companies that together control 75% of the domestic steel drum business.

The order—issued by the Federal Trade Commission and agreed to by the five steel firms—calls for those companies not to enter into or continue any "planned common course of action" among themselves or with others to fix prices of steel drums.

It also prohibits "collecting, compiling, circulating or exchanging" information concerning price factors or methods, or using such "circulated" information in computing prices. Banned, too, is the practice of quoting or selling steel drums at prices determined by a system capable of:

- Producing identical price quotations, prices, or delivered costs.
- Establishing a fixed relationship among those factors.
- Preventing purchasers from securing any price advantage by dealing with one or more of the five companies.

Named in the order: U.S. Steel Corp., Jones & Laughlin Steel Corp., Inland Steel Co., Rheem Mfg. Co., and Republic Steel Corp.

One Count Dropped

Still standing, and now apparently out of danger, is the Waksman-Schatz streptomycin patent (No. 2,449,866), which had been attacked by independent researcher Mary Marcus in her $5-million civil suit against Selman Waksman, Rutgers Research & Endowment Foundation, and Merck & Co. (CW Newsletter, Nov. 13, '54).

In U.S. District Court at Newark, N.J., Judge Thomas Meaney granted a motion by Waksman-Rutgers attorney Russell Watson for dismissal of one of the three counts in Miss Marcus' complaint. She had asked that the streptomycin patent be declared invalid; but Judge Meaney ruled that—because her 1937 patent has expired and because she's not planning to make or sell streptomycin or otherwise do anything that might infringe the Waksman-Schatz patent—she has no standing in law that would entitle her to such a judgment.

Two Counts Left: This leaves two other counts still pending; but on No. 2, the defendants gained another point when Miss Marcus' attorney Nathan Reibel withdrew a demand for an injunction that would stop Merck from making and selling the antibiotic.

Judge Meaney holds that Miss Marcus is now entitled to a jury trial on those two remaining counts: first, that Waksman "misappropriated" her asserted discovery of a certain species of actinomycetic microorganisms; and second, that Waksman used confidential information on findings that Miss Marcus says she discovered after her patent (No. 2,099,696) was granted.

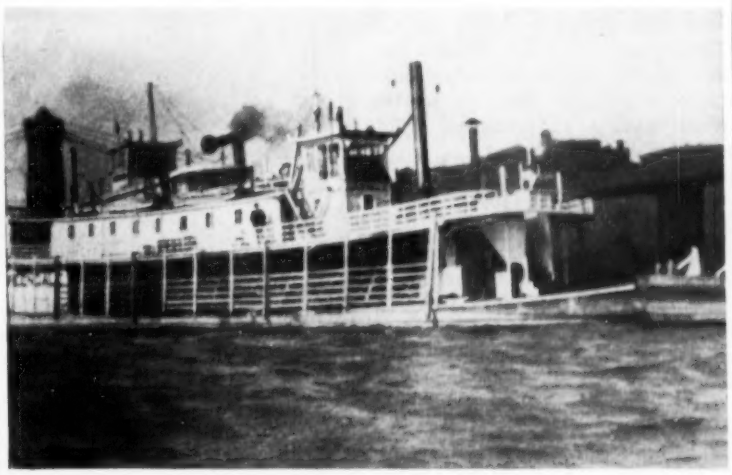
On motions to amend the two counts still in effect, the opposing lawyers got along smoothly enough; but a hitch has developed in taking the pretrial depositions. Waksman's deposition—based on four days' testimony—is about ready to be filed, and Waksman's attorneys now want to take Miss Marcus' deposition. However, Reibel is protesting that first the court should order Waksman to reply to questions that he so far has refused to answer.

Waksman, Rutgers and Merck all have denied that they are obligated to Miss Marcus, or that she has a valid claim to royalties under the license granted by Rutgers to Merck.

Loggerhead Situation

Frederick W. Richmond, young New York financier who plowed his way through a month-long struggle last year to purchase the assets of Follansbee Steel Corp., has landed in the center of a $1.3-million contest with Follansbee's successor company — Union Chemical & Materials Corp.

Basis of the disagreement: Union Chemical (which was formed from the corporate shell of Follansbee, Frontier Chemical Co., and Consumers Co.) says Richmond still owes $1.3 million on his purchase price; Richmond claims the $1.3 million was deducted from the original purchase price under terms of a deal with Follansbee. No agreement has yet been reached on how the conflict can be arbitrated.



Old-Time Glory: Modern Twist

THE NOSTALGIC TONES of a famous steamboat whistle return to Moundsville, W. Va., this week when the Sons and Daughters of the Pioneer River Men of America present the whistle from the steamboat *Stella* to the Solvay Process Division, Allied Chemical & Dye Corp. Occasion for the presentation: Chemical Progress Week celebrations. Solvay will use the whistle as its plant signal for shift changes, reminding old-timers of steamboat days on the Ohio.

EXPANSION

Cellulose: Rayonier, Inc., will build a $30-million chemical cellulose plant with an annual capacity of 100,000 tons, somewhere in southeastern U.S. No plant site has, as yet, been selected, but company officials say they expect to have their new facilities in operation within two years' time.

•

Gypsum: Kaiser Gypsum Co., Inc., will start construction (within the next two months) of a gypsum board plant and plaster mill at Pittsburg, Calif. The plant, scheduled for completion by Aug. '56, will have an annual production capacity of 180 million sq. ft. of gypsum board products, and 20,000 tons of plaster.

•

Nitrogen Products: Calumet Nitrogen Products Co. (Chicago) has started construction of a nitrogen products plant in Hammond, Ind. Capacity: 300 tons/day of anhydrous ammonia.

Standard Oil Co. (Ind.)—one of Calumet's parent companies—will operate the new facilities; the plant is expected to be in operation by May '56.

•

Coke Ovens: U.S. Pipe & Foundry Co. (Birmingham, Ala.) will install a battery of 30 chemical-recovery coke ovens—bringing its total up to 180 ovens capable of producing 3,500 tons/day of cake.

•

Aniline: National Aniline Division, Allied Chemical & Dye Corp., will build another aniline plant at Moundsville, W. Va. Release of the expansion plans follows, by less than 60 days, the word that Allied would build another isocyanate plant at the Moundsville plant site.

•

Rubber: B. F. Goodrich Chemical Co. will expand its present rubber- and latex-producing facilities at Louisville, Ky., at a cost of $2.5 million. The expansion will double the plant's current capacity; completion is scheduled for early in 1956.

Closely tied in with the company's $8.5-million acrylonitrile plant (now under construction at Calvert City, Ky.), construction on the new rubber units starts immediately.

•

Silvichemicals: Alaska Pine and Cellulose Co. will join forces with Rayonier, Inc., to build a silvichemical plant at Vancouver, B.C. Cost: over $1 million.

Produced from hemlock bark as a chemical additive for "mud" used to lubricate cutting tools and oil drills, wood chemical production in British Columbia was intimated last December when Rayonier acquired an 80% interest in Alaska Pine for $20 million.

COMPANIES . . .

Dayton Rubber Co.'s $3-million offering of 15-year, 4% convertible subordinated debentures is on the market. The company plans to use proceeds of the financing plus that from an additional $2-million placement of a 4% 15-year note to expand inventories and take care of increased sales.

•

Socony Mobil Co., Inc., and Sharples Chemicals, Inc., have agreed to final terms under which Sharples will manufacture thioprene under Socony Mobil patents.

Sharples (a subsidiary of Pennsylvania Salt Manufacturing Co.) expects to be in full commercial production by midsummer. Plant site: Houston, Tex., home of Index Chemical—another Pennsalt subsidiary.

•

Kennecott Copper Co. will convert its 325,000 shares of Kaiser Aluminum & Chemical Corp. preferred into 542,000 shares of Kaiser common. The converted common plus 100,000 shares of common previously acquired by Kennecott, gives it about 14% of the total outstanding common shares of Kaiser.

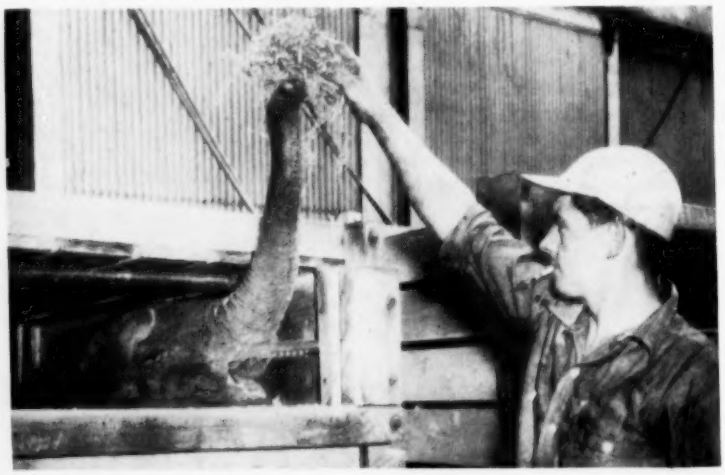
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New company divisions were set up by three major companies last week:

• W. R. Grace & Co. has established a division to be known as the Grace Chemical Research and Development Co. Named as president: William P. Gage, former president of Grace Chemical Co., now headquartered in Memphis, Tenn.

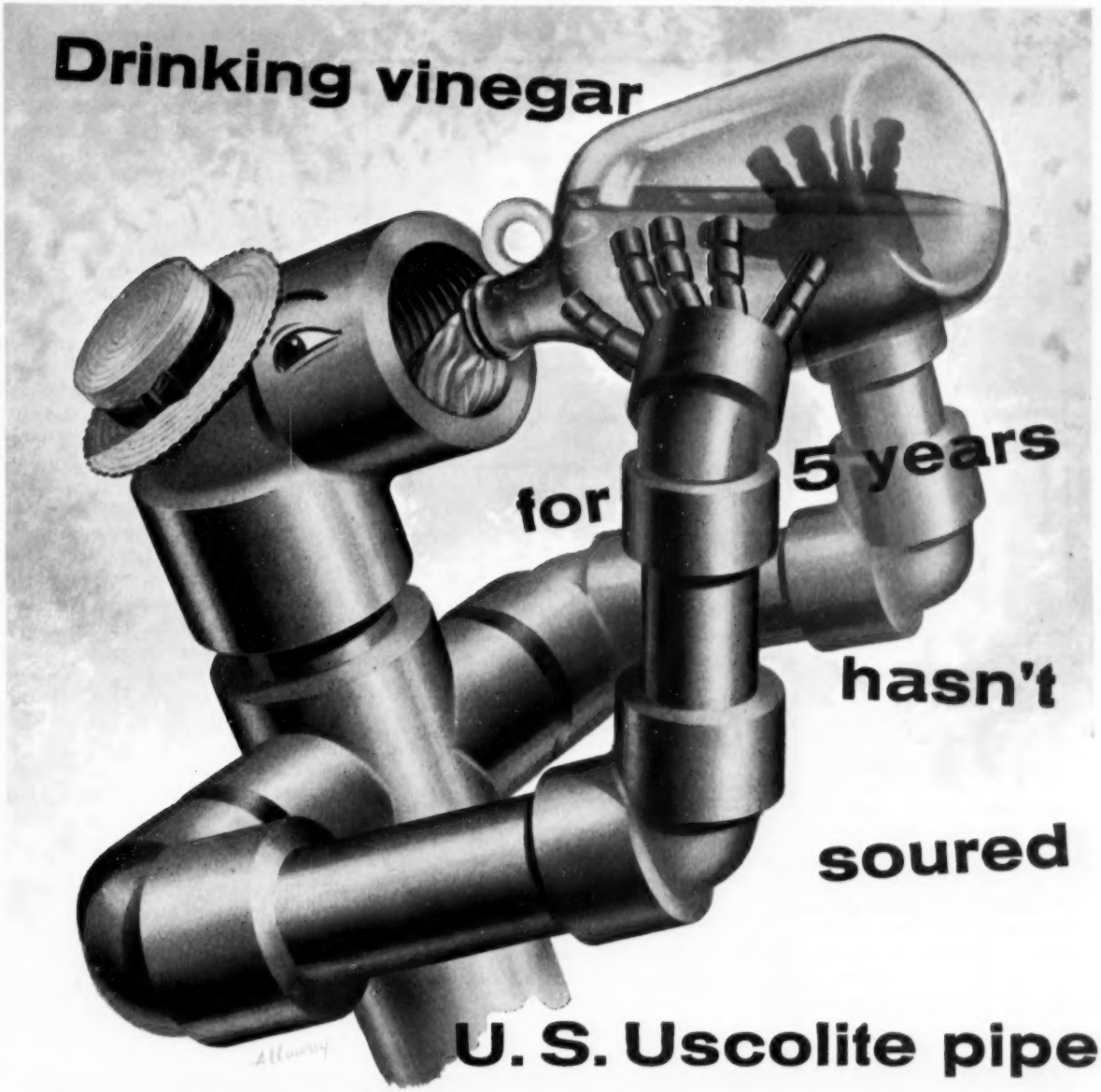
• Firestone Tire & Rubber Co. has set up a Synthetic Rubber and Latex Division to handle its recently purchased government-owned synthetic rubber plants.

• Houdry Process Corp. has established a Chemical Division to manufacture and sell catalysts.



Mammoth Side Line

NOT TO BE OUTDONE by other diversifying chemical companies, North Atlantic Fertilizer and Chemical Co. (New York) appears to be giving new meaning to the word "expansion." Though still actively trading in chemicals, in addition to representing Japan's largest crude iodine manufacturer (AIOI Chemical Industries), the company is today one of the world's largest importers of wild animals.



A plant in Louisiana uses U. S. USCOLITE® plastic pipe to carry vinegar from processing to storage vats, and from storage vats to pasteurizer and then to bottler. Previously, metal pipe had been used, and averaged *2 years' service life.* But USCOLITE has been in use steadily for over 5 years and shows not the slightest sign of corrosion or wear...gives every sign of lasting indefinitely. It imparts no odor, taste, discoloration or contamination. USCOLITE gives full flow at all times—never clogs up.

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BILLS AFFECTING BUSINESS

(By legislatures in states that have significant chemical industry—status as of last week)

Provisions of bills	Passed	Pending
Higher state taxes on company income, etc.	Md., Pa., N.Y.*	Mich., Texas
Higher taxes for unemployment insurance, workmen's compensation, etc.	Del., Ga., Mo., N.Y., Pa., Tenn., Wash.	Calif., Fla., Ill., Mass., Mich., N.J., Ohio
Higher property taxes and other local levies	Wash.	Ark., Ida., Minn., Okla.
Increased appropriation for pollution control research	———	Calif., N.Y.
Increased authority for pollution control officials or stricter requirements	N.C., Tenn.	Fla., Ill., Mass., Mo., S.C.
Quick tax write-offs for pollution control equipment	———	N.C.

* N.Y. tax law affects small firms only.

Bigger Bites, Stricter Rules

Unlike the mills of the gods, which traditionally grind slowly in all seasons, the mills of the state legislatures have been spinning at blinding speed as lawmakers hurry to clear away unfinished business and get home.

And among the new laws that have been issuing from the legislative mills in some 44 state capitals are many that will affect operations and profits of chemical process companies. In particular—as shown this week by a CW survey of states that have important concentrations of chemical industry—there are trends this year toward higher total taxation on corporate property and activities and toward more stringent regulation of factors contributing to air and water pollution (*see table*).

Site Determination: With many states and communities competing for new chemical plants, management will pore over the new state tax laws before deciding on future sites.

For example, the taxation-of-industry bill that's deemed most likely to be enacted in Michigan would base company tax rates on three factors—sales, property and payroll—instead of the sales-only basis of the present business receipts law. This proposal—sponsored by state Rep. Rollo Conlin, chairman of the House taxation committee—would tend to increase levies on Michigan manufacturers while reducing tax loads on their out-of-state competitors. The present law has been bringing in about $30 million/year, but the Conlin measure is expected to double that yield. One provision that might prove favorable for highly mechanized chemical plants: a clause permitting deductions for depreciation of equipment.

In Pennsylvania, Gov. George Leader has asked the legislature to drop the state's 1% sales tax and adopt a four-point revenue program aimed at increasing state tax receipts by more than $200 million/year. This would include boosting the corporate net income tax from 5% to 6% and applying to dividends received by corporations the same tax rate charged by the federal government.

Stop-gap Measure: Maryland's Democratic-controlled legislature has enacted an admittedly stop-gap tax program that was markedly different



WIDE WORLD

GOVERNORS CLEMENT, McKELDIN, LEADER: For bigger budgets, laws that lift tax rates for all employers.

from what Republican Gov. Theodore McKeldin had asked for. The governor had recommended that the present 4% levy on corporate income be raised to 5%, effective next Jan. 1; but the legislators thought it politically advisable to set the new rate at 4½%, retroactive to Jan. 1, '55. With expenditures increasing and state law requiring a balanced budget, the outlook is that there'll be a further boost in corporate taxes next year.

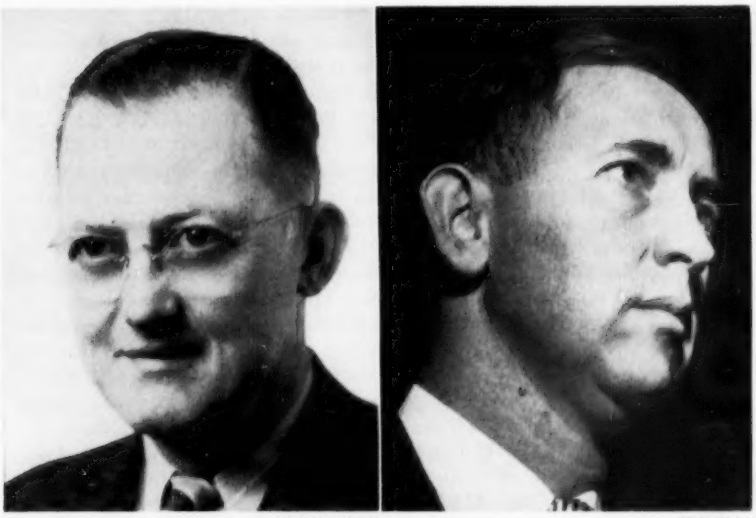
Out in Washington state, the legislature left tax rates unchanged; but it passed a law requiring county assessors to increase valuations on all property by one-fourth—a move that would prove particularly costly for chemical plants, which are usually stocked with expensive equipment. This law—known as the Ryder Act—is aimed at netting an extra 14 mills in tax rates for the public schools. Its constitutionality has been challenged by certain business interests, and will be tested in court soon.

In some states, new revenue bills are relatively kind to industry. For example, Tennessee's Gov. Frank Clement is getting legislative clearance to raise an additional $35 million/year for the state's general fund through nonbusiness taxes. On the other hand, Tennessee is one of 20 states that have liberalized their unemployment compensation laws—at employers' expense.

Specific Chemical Taxes: The rich crop of oil, gas and petrochemicals harvested each year in Texas has drawn covetous glances from a number of Lone Star solons responsible for finding new revenue sources. Rep. Maury Maverick—son of the late congressman of the same name—suggested a 0.25% levy on gross sales of synthetic chemicals produced in the state; and Rep. Jerry Sadler—a snuff-dipping, country-talking legislator—proposed a 1¢/gal. tax on all "combustible condensates" produced in Texas refineries. A more serious measure now being worked out at Austin would reportedly put a 2% tax on income from sales of "metals or liquids produced by any chemical, metallurgical or electrolytic process"—apparently intended to cover plastics and magnesium in particular.

Numerous also are antipollution measures that may require action on the part of various chemical process firms. One of the more prominent lawmakers in this field is North Carolina's state Sen. Lunsford Crew, who is sponsoring two major antipollution bills at this session. One would allow industry to write off the cost of waste-treating facilities in five years instead of on the normal depreciation basis, and would exempt such equipment from local property taxes; the other would strengthen the hand of the State Stream Sanitation Committee in dealing with offenders.

By next month, the legislatures will have wound up their current sessions, leaving in their wake several hundred new laws in each state for management to take note of in all future business decisions.



LE CLEAR STUDIO WIDE WORLD

STATE SOLONS CONLIN, CREW: 3-prong tax bill; fast depreciation plan.

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Licensing of Exports to Soviet Countries Is Rising Sharply

(in thousands of dollars)

	Export License Applications		Actual Exports to the U.S.S.R. and European Soviet Bloc
	Received	Approved	
1953			
1st. Quarter	491	390	815
2nd. Quarter	100	94	394
3rd. Quarter	114	109	115
4th. Quarter	2,044	2,043	451
Total, 1953	**2,749**	**2,636**	**1,775**
1954			
1st. Quarter	42,142	4,011	330
2nd. Quarter	4,472	3,097	552
3rd. Quarter	3,661	1,340	851
4th. Quarter	17,987	10,355	4,314
Total, 1954	**68,262**	**18,803**	**6,047**

Strategics: Still Sticky

Licensing of U.S. exports to the European Soviet bloc is rising sharply, according to a report on export controls published last week by Secy. of Commerce Sinclair Weeks. Sharing in the general increase: chemical companies—in all sectors of the industry. Over-all, the Commerce Dept. approved $10,355,000 worth of applications for exports to the Soviet bloc in the fourth quarter of 1954 compared with $1,340,000 in the third quarter, and $2,043,000 in the fourth quarter of the previous year. The value of export licenses approved for shipments of chemicals to the Soviet bloc in the last quarter of 1954 was $797,961—up from $493,017 in the previous quarter.

But, contrary to expectation, strategic materials lifted from the embargo list by last August's control liberalization have accounted for little of the increase. Biggest slice of the increase in export license approvals was accounted for by emergency famine relief shipments of U.S. food grains to the European satellites.

Flood of Inquiries: The number of inquiries from chemical producers as to the possibility of trade with Iron Curtain countries has been soaring in recent months, however, Commerce officials report. Whereas this time last year the department was receiving two inquiries per week, the average now is seven or eight.

More inquiries should lead to more applications, and more applications should boost the approval rate. But so far that hasn't been the case at all. Only eight licenses, with a total value of $3,472, were approved in the fourth quarter of 1954, which would not have been approved before the liberalization of controls. Of these, only two were for exports of chemicals—$150 worth of lighting carbons, and $10 worth of tetraethylammonium chloride.

Actually, a higher percentage of export license applications was refused in 1954—the year of export control liberalization—than in 1953. And the percentage of license approvals that resulted in actual shipments also dropped, despite an increase in actual exports (*see table*).

Exports of chemical products to Iron Curtain countries in 1954 were negligible. Altogether, the U.S. exported $179,000 worth of coal-tar acids to the U.S.S.R., and $39,000 worth of agricultural insecticides to East Germany. These exports were outweighed by imports of chemicals from the Soviet bloc—$1,915,000 worth of benzene and $1,486,000 worth of fertilizers from Poland.

A number of chemicals and types of chemical equipment, meanwhile, were added (during the fourth quarter of 1954) to the positive list of items that may not be exported without a license. Included: monomethylaniline, polyvinylbutyral film and sheeting, trifluoromonochloroethylene, tetrafluorethylene, naphthenates of all metals, medicinal grade of chemicals (of which other grades were already on the list), and equipment for making chlorine, sodium, magnesium, deuterium oxide, hydrogen, and military explosives.

At Stake: 147 Licenses

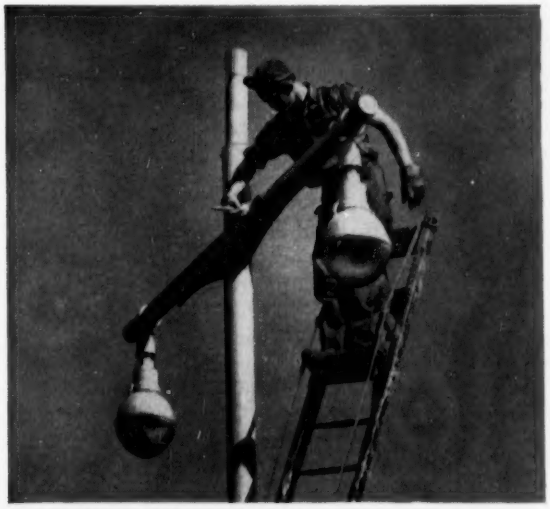
Significance of the lawsuit between Du Pont and Nopco over isocyanate foam plastics patents becomes more apparent this week, with Du Pont seeking to establish the validity of its "basic" patents and Nopco seeking to show that it's properly licensed under Lockheed patents.

Latest indication of the scope of this suit: Du Pont's motion for dismissal of Nopco's counterclaims, which asked that Du Pont patents 2,284,637 and 2,333,639 be declared invalid. This could be viewed as a move by Du Pont to limit the number of its licenses that might be affected by the ultimate decision in the case. At present, 147 licenses that Du Pont says it has issued under its isocyanate foam patents appear to be at stake in the contest.

Previously, Du Pont had narrowed its charges by stating that Nopco has infringed only 5 of the 22 claims under Du Pont patent 2,282,827. Now Du Pont says there is no need to discuss those two other patents in the case at all, because Nopco is not charged with infringing them.

This week, Nopco is expected to complete taking depositions from past and present Du Pont employees. It looks now as though key issues will involve establishing dates of earliest conception and reduction to practice on the five allegedly infringed claims—and Du Pont's replies to Nopco interrogatories list those dates as Aug. '38, for earliest conception, and Sept. '38 and Aug. '39 for reduction to practice.

Enjay helps keep your sales out front



IN SURFACE COATINGS *(Paint and Varnish)*



IN PETROLEUM *(Lubricants and Gasoline Additives)*



IN CHEMICALS *(Synthetic Fabrics)*

Products that lead in sales are the products that deliver dependable quality and performance. And where quality and performance count, rely on Enjay. Enjay supplies the chemical, surface coating and petroleum industries with a complete line of uniform, high quality petroleum chemicals, backed by pioneering research, experience and proved results. Enjay is also ready to assist you in developing new or improved products through chemistry. Call Enjay *next* time for your chemical needs.

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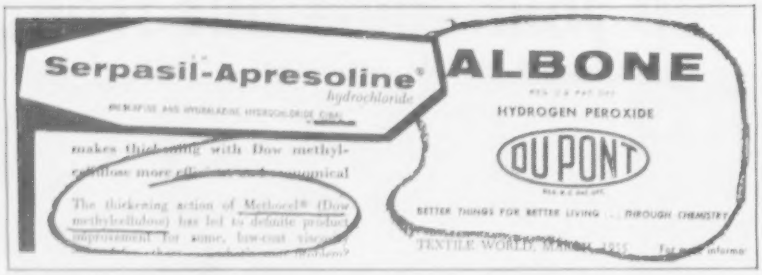
SURFACE COATING
PETROHOL 91
PETROHOL 95
PETROHOL 99
JAYSOL
Secondary Butyl Alcohol
Secondary Butyl Acetate
Isopropyl Acetate
Acetone
Methyl Ethyl Ketone
Dicyclopentadiene
Ethyl Ether
Isopropyl Ether
Naphthenic Acids
Iso-Octyl Alcohol
Decyl Alcohol
Denatured Ethyl Alcohol

CHEMICAL
PETROHOL 91
PETROHOL 95
PETROHOL 99
JAYSOL
Iso-Octyl Alcohol
Decyl Alcohol
Denatured Ethyl Alcohol
Tridecyl Alcohol
Dicyclopentadiene
Isoprene
Butadiene
Ethyl Ether
Isopropyl Ether
Tetrapropylene
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ENJAY

35 successful years of leadership in serving industry



VULNERABLE: In a burgeoning market, coveted chemical trademarks require . . .

Vigilance Against 'Pirates'

Misuse and infringements threaten valuable company properties both at home and overseas.

So legal men warn everyone from company heads to foreign sales agents: alertness is indicated.

In coming months, more so than ever before, chemical legal men will be tightening protection on company trademarks. Reason: here (and increasingly so abroad) trademark problems are multiplying.

In the U.S., one factor is that chemical companies now turn out more finished consumer products (and intermediates) than in the past. Overseas, headaches are increasing because chemical suppliers are courting wider foreign markets with trademarked goods.

Recently, the U.S. Trademark Assn. (whose membership includes 48 chemical firms) cautioned, " . . . two large-scale instances of trademark counterfeiting, the first of such magnitude in the U.S. in years, were detected in 1954." Then just last month, Coty, Inc. found itself involved in trademark litigation with Revlon Products Corp. (*CW Newsletter, April 16*). Quick to recognize danger signals, chemical companies are now triggering action to bulwark their vulnerable trademarks.

Starred Issue: Admittedly, counterfeiting and "pirating" trademarks has always plagued chemical legal departments. Currently, however, greater stress is on keeping trademarks from getting "genericitis." Through misuse by the public (even by advertisers, dealers, or companies themselves), trademarks lose significance, slip into common usage. Before long, chemical makers find they've lost their valuable industrial properties (two of the more classic cases: cellophane, aspirin).

Discussing generics, Dow Chemical Company states, "The issue is particularly touchy these days because small manufacturers like to associate their own products with nationally known trademarks." Reason: they're seeking part of the goodwill major suppliers build through big national advertising campaigns.

Dow, for example, sells expanded polystyrene foam under its trademark Styrofoam. Small users of Dow's polystyrene may wrongly say "made of styrofoam" (uncapitalized) in advertising their own products. Treating trademarks like common nouns (e.g., like wood, cork, cotton) starts a dangerous ball rolling toward generic usage, eventually destroying trademark significance.

Tricksters Overseas: While blocking generic usage busies chemical company legal men here, abroad they're facing adoption of confusingly similar trademarks by local people. Foreign trademarkers will copy marks closely enough to cause mistakes, allow some deviation to permit argument if challenged.

Also worth attention these days: local authorities (especially in countries where English isn't the official language) frequently try registering English words or abbreviations as trademarks. "DDT" in Argentina, "Latex" in Peru, and even "Plastic Materials" in Brazil have already been beaten off as unsuitable trademarks by one quick U.S. chemical manufacturer.

Local foreign distributors, furthermore, frequently claim for themselves trademarks of U.S. chemical companies they represent. No real problem exists while relations continue amicably. But, should the distributor later favor purchasing another supplier's products (or even make them himself), he might expect to continue using the original trademarks.

Spotting Trouble: Foresighted chemical companies in the U.S. now rely mainly on their own sales organizations to spot misuse and infringements of trademarks. They're also counting more on company trademark attorneys (U.S. and foreign) to uncover applications that might prove troublesome later on. Abroad, filing early opposition to registration of adverse marks usually settles most problems amicably and quickly. Misuse here, in most cases, is best resolved by friendly explanation to the misuser. Rarely, though, blunt warnings are issued.

By briefing sales and advertising people so they'll recognize and correct potential trademark sore spots early, many situations can be headed off. Needless to say, mutual cooperation between sales, advertising staffs, and legal departments pays off in rapid resolving. But speed's essential.

Other weapons currently being used for waging the trademark battle: (1) booklets stressing proper use of company trademarks and circulated down the line by larger companies; (2) clipping services for monitoring usage; (3) active participation in trademark associations.

No Global Preserves

Another roadmark in the antitrust trail being blazed by the Eisenhower Administration: settlement by advance negotiation of a case against American MonoRail Co. (Cleveland), maker of equipment for textile mills and other manufacturing plants.

This action, says the Dept. of Justice, has snapped off U.S. participation in an alleged cartel arrangement setting up global sales preserves. Attorney General Herbert Brownell says North and South America had been allotted as the Cleveland firm's sales territory, leaving all other areas for certain British concerns. The consent decree, Brownell adds, will make way for open competition in this field.

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of esters, amides, ketones, peroxides, ureides and many other acid derivatives,

ACID CHLORIDES (RCOCl)

by TRUBEK

In many cases, acid chlorides are indispensable. Advantages include better yields and conversions, shorter reaction times, lower reaction temperatures and lighter colored finished products:

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Esters from alcohols

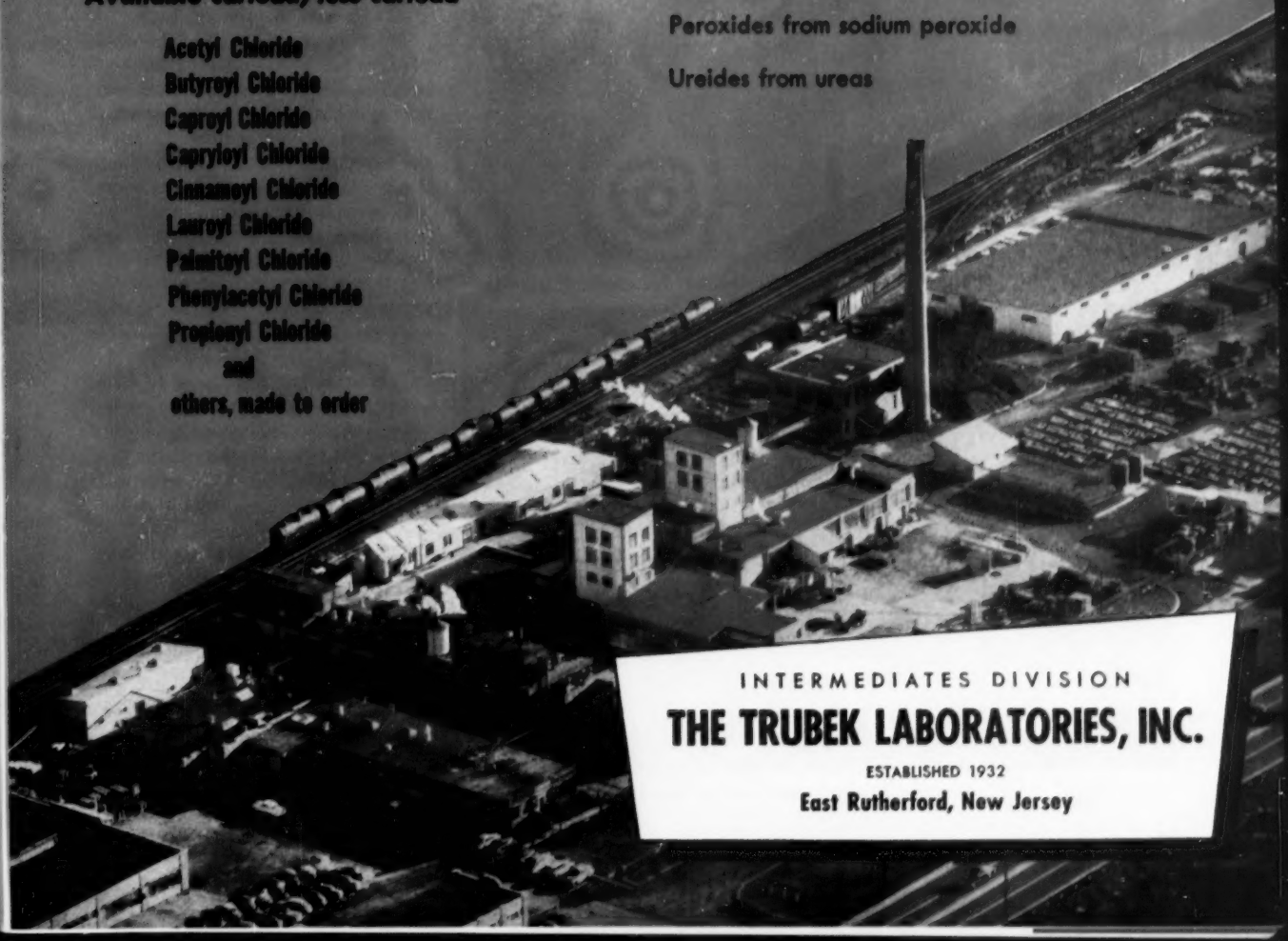
Ketones from aromatic hydrocarbons

Peroxides from sodium peroxide

Ureides from ureas

Available carload, less carload

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Butyroyl Chloride
Caproyl Chloride
Capryloyl Chloride
Cinnamoyl Chloride
Lauroyl Chloride
Palmitoyl Chloride
Phenylacetyl Chloride
Propionyl Chloride
and
others, made to order



INTERMEDIATES DIVISION

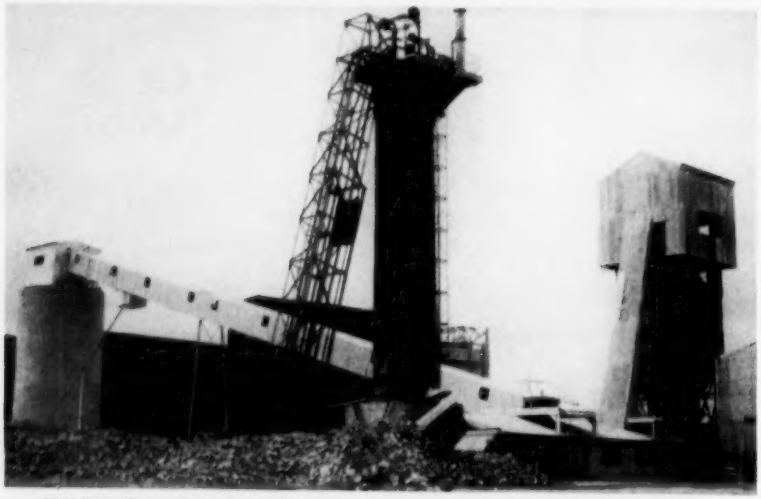
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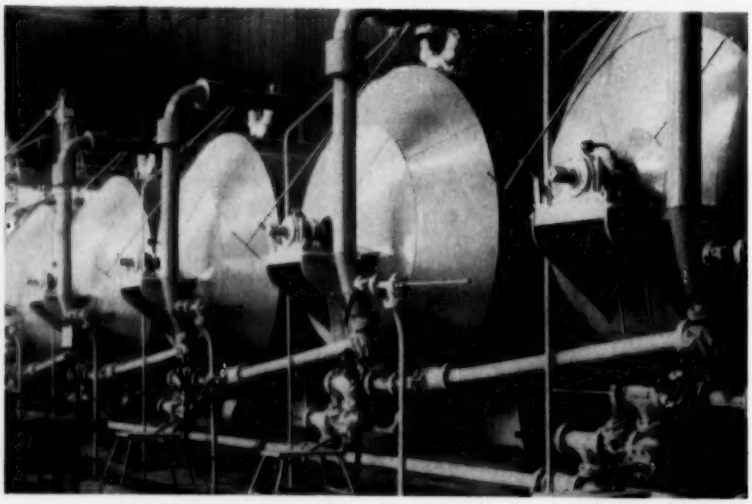
East Rutherford, New Jersey



BELL BAY WHARVES: Especially constructed for new aluminum facilities.



KILNS: Burn limestone (left), dry bauxite too wet for crushing (right).



FINAL STEP: Alumina-to-aluminum units go onstream in July.

Australian Venture:

Now a Reality

When Australia's Howard Beale, Federal Minister for Supply, pressed a button at Bell Bay in Northern Tasmania last month, the first stage in Australia's spanking-new aluminum industry was completed.

But more important, it signaled what may prove to be the start of a tremendous round of basic chemical production down under.

During the next few months, Australian industry spokesmen state, Australia will seek to build up its stocks of alumina (using huge quantities of caustic soda). Then, in July, additional plant units will be brought onstream to reduce the alumina to aluminum ingots.

Original estimate of the cost of the project (made some 10 years ago) was £3 million— but due to rising costs, labor shortage, and changes in plant and construction design, the entire operation will cost over £10.7. Capacity: 25,000 tons of alumina and 13,000 tons of ingot annually.

Most important aspect of the whole plan, as far as Australians themselves are concerned, is the annual savings in dollar imports the industry will permit. At the most conservative guess, the government will save some $5 million the first year the plant is in operation, more in succeeding years.

Problem Hurdled: Greatest single problem the Australians faced in carving themselves out a chunk of the aluminum market, industry spokesmen recount, was the lack of available power.

Tasmanian officials assure them, however, that by the time the second phase of the aluminum-producing operation is ready to start up, the new generating station at Trevallyn, a Launceton suburb, 40 miles from Bell Bay, will be completed.

Raw materials (bauxite and limestone) are readily available; the Australia chemical industry is rapidly triggering growth of fabricators, ready to turn the aluminum produced into finished end-products.

Biggest new project of the chemical industry in the past decade, the Bell Bay facilities should prove to be the stimulus for more rapid industrialization of Australia in the years ahead.

YOU'LL FIND A PLEASANT DIFFERENCE IN ODOR WHEN YOU SWITCH FROM N-BUTYL ACETATE TO

isobutyl acetate



We've often emphasized the fact that the odor of isobutyl acetate is preferable to that of normal butyl acetate.

Now, users are becoming aware of the difference, too. Recently, we received a letter from a customer who had switched to isobutyl acetate over a year ago and had used no n-butyl acetate since then. In his letter he remarked that he had just visited a lacquer plant that still used n-butyl acetate. He told us he actually was surprised to note the sharp contrast between n-butyl acetate and the light, clean odor of isobutyl acetate.

Better odor is just one of the many advantages of isobutyl acetate. It is a lacquer solvent in its own right as well as a satisfactory replacement for the higher-priced n-butyl acetate. Its quality is uniformly high. Its price is low and stable. And, because it weighs less per gallon than normal butyl acetate, you get a "gift" of 115 extra gallons in every 60,000-pound tank car you buy.

Today, many lacquer manufacturers are replacing all or part of the n-butyl acetate (and other solvents, too) in their formulations with lower-priced isobutyl acetate. In many plants, deliveries of isobutyl acetate are being made directly into tanks formerly used for normal butyl acetate.

For more information on how this Eastman solvent can reward formulators interested in exploring new ways to cut costs, write to Eastman Chemical Products, Inc., Chemicals Division, Kingsport, Tennessee.

Eastman

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Description: White, soft powder.
Uses: Oxidizing; bleaching; disinfectant.
Average Analysis:

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$NaClO_3$	4.9%
NaCl	10.3%
NaOH	0.5%
Na_2CO_3	2.5%
	98.7%
H_2O	Remainder

CHLORITE STABILIZER

An auxiliary agent for use in all Sodium Chlorite bleaching. Remains stable during storage; aids in regulating the rate of release of chlorine dioxide; aids in overcoming fluctuations of pH in chlorite bleaching solution insuring uniform bleach effect; wetting agents, other auxiliary textile agents and inhibitors normally used which are stable to sodium chlorite can continue to be used.

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CHURK CEMENT PLANT: Now turning out 700 tons/day of cement.

FOREIGN. . . . . .

Cement/India: Using thermal electric power to help build a hydroelectric dam may not be a new idea, but the Brush Group's 7,200-kw. installation (now at Churk, India) has the unique feature that once you're through with it (when the dam's completed) you can move it somewhere else.

Installed in the eastern Uttar Pradesh district to provide power for production of cement, the mobile power station will be removed once the cement plant has provided enough material to build India's contemplated Rihand hydroelectric dam. Estimated output of cement: 700 tons/day; estimated date when the dam will be in operation: 1957.

•

Japanese-Chinese Trade: The Red Chinese trade mission now visiting Tokyo is believed to have invited representatives of the Japan Penicillin Assn. to visit China for talks on export-import possibilities.

The Chinese, reportedly, would especially like to negotiate on the problem of setting up new standards for the inspection of penicillin purchased by Red China, and arrange long-term contracts with Japanese manufacturers.

•

Polyethylene/Germany: Farbwerke Hoechst, Deutsche Erdoel, and the steel combine, Mannesmann Steel Co., have formed a new plastics company, Kohle-Oel Co., at Gelsenkirchen, Ruhr, to produce polyethylene. Commercial production is due to start in the spring of 1957 at an initial output rate of 24,000 tons/year. Process: the new Ziegler normal-pressure process, developed last year by the Institute for Coal Chemistry at Mulheim, in the Ruhr.

Chemische Werke Huels (another Farben splinter) at Duesseldorf is also said to have acquired a new process to make polyethylene. Plans for large-scale production are currently under consideration.

•

German-Brazilian Cooperation: Rei-Chemie Co. (Beppard, West Germany) has formed a new company, Rei-Chemie de Brazil, to produce synthetic detergents in Brazil. Cooperating in the deal: Brazilian Valente SA.

Initial project of the new company will be to build a 100-ton/month detergent plant at Petropolis (near Rio de Janeiro).

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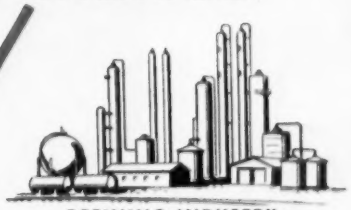
Caustic Soda/India: Tata Chemicals —India's largest private manufacturer of soda ash and caustic soda—reports a 15% increase in production last year. Meanwhile, however, talk of possible industry nationalization continues to depress market prices.

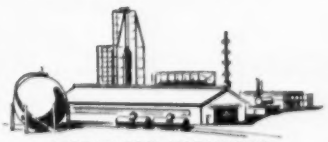
So far, New Delhi has been helpful toward private enterprise because supplies of soda ash and caustic soda have not been abundant. But nationalization becomes a more immediate threat, company representatives say, when any industry in India shows signs of overproduction.

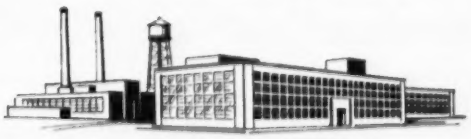
Over 6 Million Tons of
SULFURIC ACID*

produced annually in plants designed and built by CHEMICO

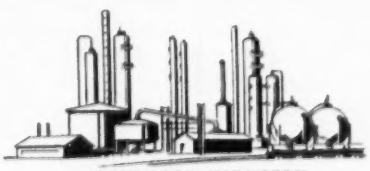
More than 165 Chemico H_2SO_4 plants are today in operation all over the world

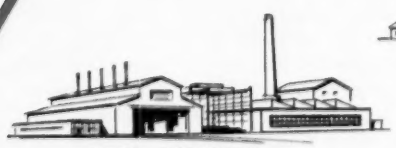

REFINING INDUSTRY

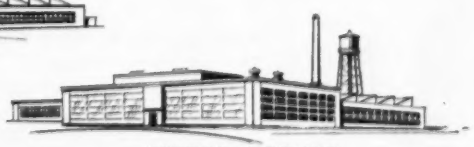

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WIDE WORLD

JUDGE HOLMES: In Louisiana, 'fair trade' prevails, with label or not.

LEGAL. . . . . .

Labels Not Material: While "fair-trade" laws may be losing ground in some states and may run into rough treatment in Washington (*CW, May 14, p. 18*), they're still potent in Louisiana. In fact, a recent U.S. Court of Appeals decision written by Judge Edwin Holmes actually broadens the laws' scope in that state to cover drugs used to fill a prescription, even though the pharmacist may have removed the label or trademark. A customer's awareness of the name of the drug in a prescription is not an essential factor, Holmes wrote; as long as the prescription designates the drug by the manufacturer's name or trademark, the fair-trade laws are applicable. The ruling upheld a district court decision in favor of Hoffmann - La Roche against Schwegmann Brothers Giant Super Markets (New Orleans).

Two other chemical process companies—Colgate-Palmolive and Julius Schmid pharmaceutical house—each won injunctions against cut-rate retailers in New York City; but in Portland, Ore., Circuit Judge Lowell Mundorff ruled that the state's fair-trade law is invalid because it involves an unconstitutional act on the part of the state legislature—delegation of the power to fix prices. Mundorff also criticized the "basic unsoundness" of the nonsigner clause, and objected that the price maintenance contract in question did not provide for the manufacturer to give or do anything as consideration for the retailer's agreement.

•

Phosphate Prices: In those fair-trade suits, the complaint was that somebody was setting prices too low; but in a case pending in federal district court at Little Rock, Ark., the contention is that a chemical company pushed its prices too high. Arkansas Plant Food Co. is asking $228,000 as triple damages in a civil antitrust suit against Olin Mathieson Chemical Corp., charging in effect that Olin Mathieson was taking unfair advantage of a virtual monopoly situation. Arkansas Plant Food asserts that Mathieson overcharged by $1/ton on 76,178 tons of fertilizer materials bought by the Arkansas firm between 1950 and '54; and states a belief that Mathieson didn't raise its prices for other customers. Mathieson, the complaint adds, has been the only source of superphosphate in the state.

•

Valid, Not Infringed: The U.S. Supreme Court has refused to review the dispute between Darsyn Laboratories and Gamma Chemical Corp. over Darsyn's 1949 patent on a two-stage process of hydroxyquiniline manufacture. Accordingly, the verdict of the district court—as affirmed by the circuit court—still stands: the patent is valid, and has not been infringed.

Time for a Checkup

If your plants are covered by "standard form" use-and-occupancy insurance policies, this may be the time to check with your insurer on the protection you're getting now and the kind of policy you'll be offered on renewal.

Reason: the way in which the main issue seems to have been resolved in the million-dollar lawsuit between Ethyl Corp. and six insurance companies that are members of the Factory Insurance Assn. (*CW, April 16, p 32*), which has just ended with an out-of-court settlement. Reported basis for the settlement: payment by the insurance companies of a "substantial" portion of the more than $2.3 million that Ethyl had sued for.

This settlement suggests that the insurers now concede that in standard-form policies such as those held by Ethyl, there is protection against loss of production—even though the manufacturer has built up inventories that

to

CONTROL CORROSION

where only

MINIMUM SURFACE PREPARATION

is possible

use the

Amercoat 33 over 86 System

There is no substitute for ideal surface preparation. But every maintenance engineer is confronted with corrosion problems in locations where only minimum surface preparation is possible. The Amercoat 33/86 System is amazingly helpful in many of these cases. Here is how it works:

FIRST: apply Amercoat 86 Primer, brushing it well into the surface. This unique primer has a high tolerance for surface contamination and will adhere to many problem surfaces.

- It is both inhibitive and chemically resistant.
- It stifles underfilm corrosion and under-cutting.
- It forms a truly compatible base for vinyl topcoats, eliminating peeling and lamination.

THEN: apply Amercoat 33, the time-tested vinyl coating. Because of its high solids content, you get a thicker, heavier coating – "more mils per gallon". Applied by hot spray* or conventional spray, it takes fewer coats of Amercoat 33 to build the required film thickness.

In addition, you get more economical protection per square foot per year because Amercoat 33 is formulated specifically for maximum chemical resistance and for severe weathering conditions.

**Follow the line of MOST resistance*

**You have the confidence of knowing that more Amercoat 33 has been applied by hot spray than any other vinyl maintenance coating! No need to stock two types of material*

If you have a difficult corrosion problem in your plant, perhaps we can help you. Our fifteen years of specialized experience is at your service. Write for literature and the name of the trained Amercoat representative in your city.

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"I got my METHYLENE CHLORIDE (Dichloromethane) from DIAMOND. They make two grades: Refrigeration (RG) and Paint Remover (PRG). Used for aerosol propellant and extractants, too. Underwriters' rates it nonflammable under ordinary heat, and we used it, up to 60 C., in the presence of air, water and light. Shipped in tank cars, drums and cans."



"Sure, we always order DIAMOND'S METHYL CHLORIDE (Chloromethane). Resists oxidation up to 200 C. Fine thermal stability, with little decomposition below 400 C. in the absence of air and water. Comes in tank cars only as liquefied gas under pressure."



"DIAMOND ships our Technical grade CHLOROFORM in tank cars, drums and cans; our U.S.P. grade in cans and drums. We use both with common construction materials up to 120 C."



You'll be pleased, too, with DIAMOND chlorinated methanes. They're shipped promptly. Simply phone your nearby DIAMOND sales representative. Or write DIAMOND ALKALI COMPANY, 300 Union Commerce Building, Cleveland 14, Ohio.

DIAMOND CHEMICALS

Diamond Chemicals

CONTRIBUTORS TO CHEMICAL PROGRESS

assure against any loss of sales.

That was the situation in the Ethyl case following a fire in its tetraethyl lead plant at Baton Rouge, La., on May 11, 1953. Ethyl said damage to equipment caused total loss of production for three days and partial loss for nearly five months; and it insisted that use-and-occupancy insurance should protect a mercantile establishment against loss of sales, and a manufacturing operation against loss of production.

FIA undertook to defend the suit for its member companies, but failed to force a revision of Ethyl's complaint. The consent decree was filed in U.S. District Court, New York, less than four months after the suit was started.

In bringing the suit, Ethyl had charged that the insurance firms' "purported interpretation of said policies would render valueless and meaningless virtually all use-and-occupancy insurance policies issued to manufacturers throughout the U.S."

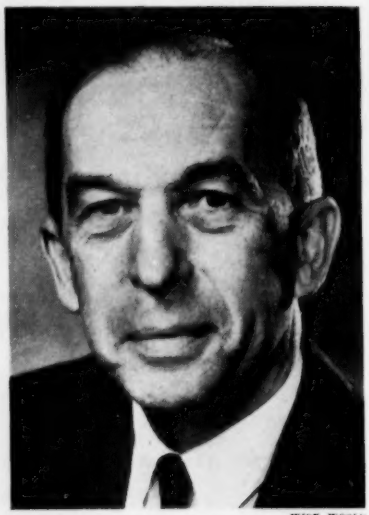
Next question: whether FIA companies now will rephrase their use-and-occupany policies to avoid liability for similar claims in the future.

LABOR

A Seething Cauldron: The guaranteed-annual-wage issue reached the boiling point this week, with indications that GAW may become a bargaining demand in some branches of the chemical industry.

• The Oil, Chemical & Atomic Workers (CIO)—whose leaders only a few months ago were saying that this industry's employment was stable enough so that GAW wouldn't be needed—now can be said to have taken a considerably different stand. "Temporary and seasonal layoffs," OCAW now declares, "are a troublesome problem in a few branches of the chemical industry, particularly in cosmetics and fertilizer. The sad part of it is that the products of these industries are not perishable, and production could be scheduled evenly to build up backlogs for the rush seasons. The workers in cosmetics and fertilizer plants—at least in some of them—could well use a guaranteed annual wage."

• That GAW might contain special dangers for growth industries was suggested by Pittsburgh's Frank Cliffe, vice-president of H. J. Heinz Co., who compared GAW to "a beautiful rose—



WIDE WORLD

PITTSBURGH'S CLIFFE: On GAW rose, he sees threatening thorns.

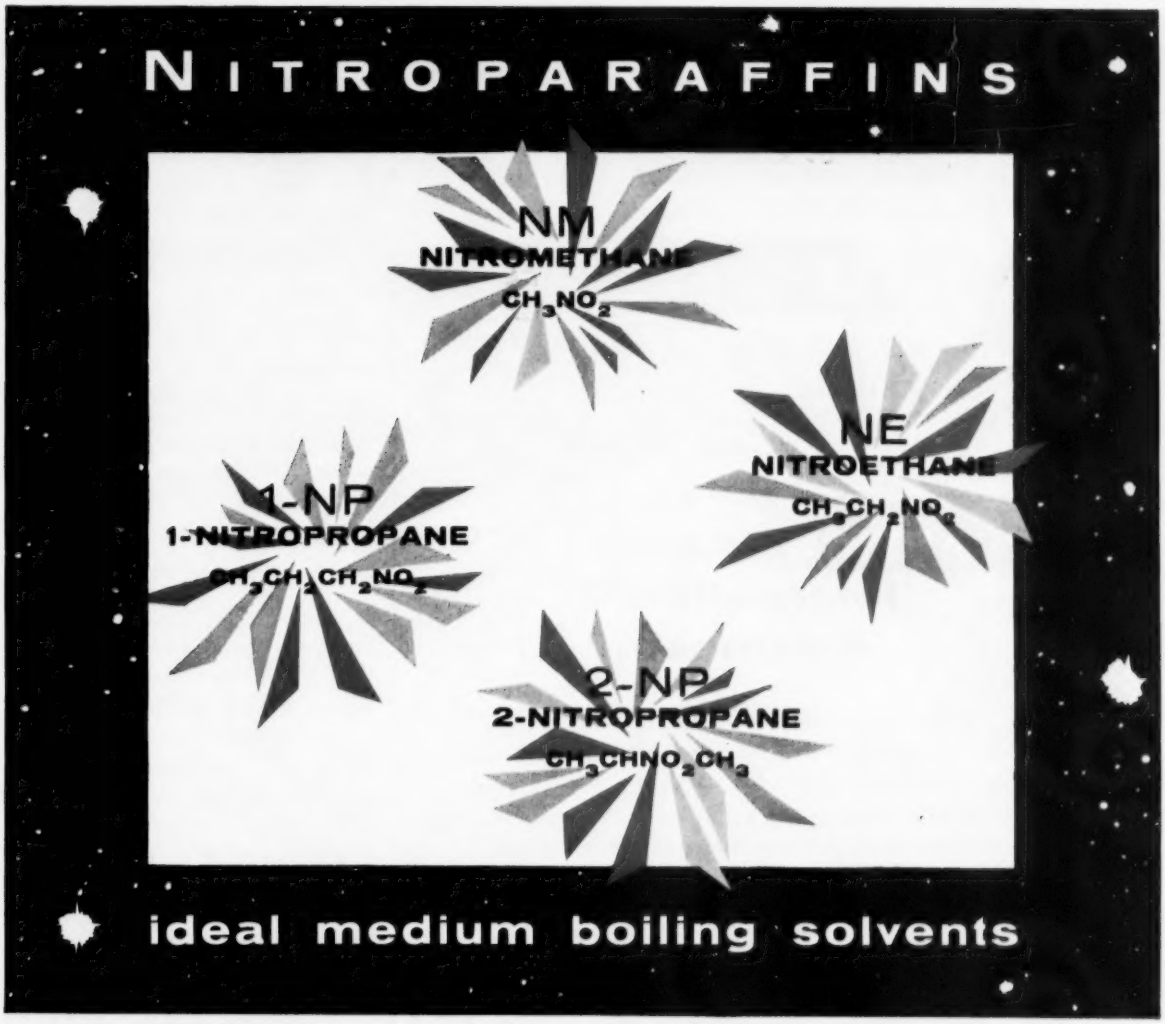
with thorns that can scratch you." He warned that GAW could destroy an employer's willingness to expand, thus tending to curtail workers' job opportunities. "I am in strong sympathy with the desire for steady work and steady pay," he told members of the Chamber of Commerce of the U.S., "but GAW seems to be the wrong tool for the job."

• In the auto industry, which the CIO hopes will be the proving ground for the GAW, locals of the CIO's United Auto Workers are conducting strike votes to determine whether rank-and-file members will be willing to "hit the bricks" in support of the GAW demand. This tactic came after reports that General Motors and Ford were balking on this demand in new contract negotiations at Detroit.

•

All or None: "No one can be perfectly happy till all are happy," essayist Herbert Spencer once opined; and certain chemical companies have been finding that pleasing one local union may lead to difficulties with another.

• On April 12, Monsanto and Local 12 of the International Chemical Workers Union (AFL) agreed on a one-year contract with a no-strike clause and a 5¢/hour across-the-board wage increase. On April 25, Monsanto and ICWU Local 16 signed a two-year pact providing for a 9¢ wage rise now and an additional 5¢ boost next April. This displeased members of Local 12, and they staged a wildcat strike—in disregard of their no-strike pledge—



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AMPD (2-Amino-2-methyl-1, 3-propanediol)
AMP (2-Amino-2-methyl-1-propanol)
NB (2-Nitro-1-butanol)
NEPD (2-Nitro-2-ethyl-1, 3-propanediol)
NMPD (2-Nitro-2-methyl-1, 3-propanediol)
NMP (2-Nitro-2-methyl-1-propanol)
TRIS AMINO (Tris [hydroxymethyl] aminomethane)
TRIS NITRO (Tris [hydroxymethyl] nitromethane)
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HC (Hydroxylammonium Chloride)
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B & I. . . . . .

that lasted a week before ICWU Vice-President John Gratz persuaded the men to go back to their jobs. Since before the strike began, Monsanto has stated that it is willing to give Local 12 the same terms it granted to Local 16; but Local 12 has been demanding the higher wage increase on a one-year contract.

• Signing contracts with seven AFL unions wasn't enough to get Dow's big Freeport, Texas, plant back into operation. An eighth union—the AFL Electrical Workers—had to be placated before the rest of the plant's 3,000 hourly paid employees would return to their jobs.

KEY CHANGES. . .

Richard S. Moore, to general sales manager, Harbison-Walker Refractories Co. (Pittsburgh).

Robert S. Judd, to director, Carwin Co. (North Haven, Conn.).

Robert W. Crabtree, to manager, nitrogen products sales, Hercules Powder Co. (Wilmington, Del.).

Neil B. Conley, to director, sales, Organic Chemicals Division, American Cyanamid Co. (New York).

Thomas A. McCoy, to manager, synthetic rubber operations, Texas-U.S. Chemical Co. (Port Neches, Tex.).

Jerome T. Coe, to sales manager, silicone products, General Electric Co. (Pittsfield, Mass.).

L. C. Kemp, Jr., to general manager, petrochemical department, Texas Co. (New York).

Charles B. Hann, to manager, chemical section, Johns-Manville Corp. (New York).

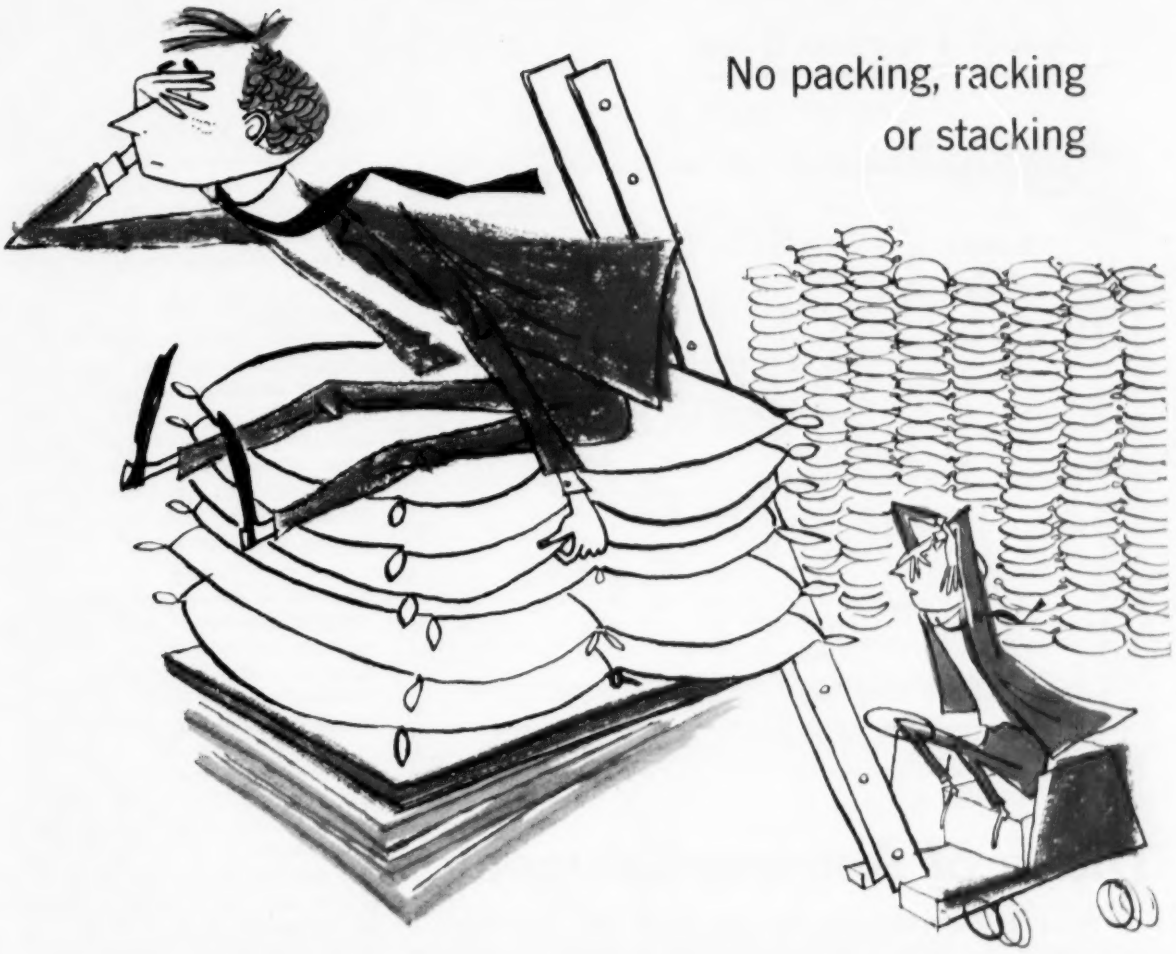
E. William Endter, to president, **Cecil E. Wolfson,** to board chairman, and **J. C. Knochel,** to director, Devoe & Raynolds Co., Inc. (Louisville, Ky.).

Drew M. Thorpe, to executive vice-president, General Refractories Co. (Philadelphia).

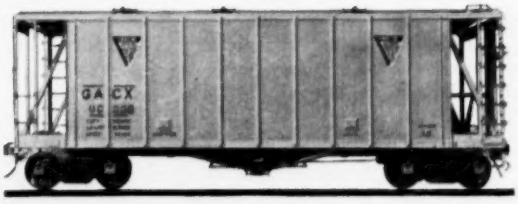
Carlyle G. Caldwell, John F. Fitzgerald, Robert W. Merritt, and **S. F. Thune**, to vice-presidents, National Starch Products, Inc. (New York).

Milton C. Mumford, to director, Lever Brothers Co. (New York).

E. E. Howe, to vice-president, Chicago Vitreous Corp. (Cicero, Ill.).



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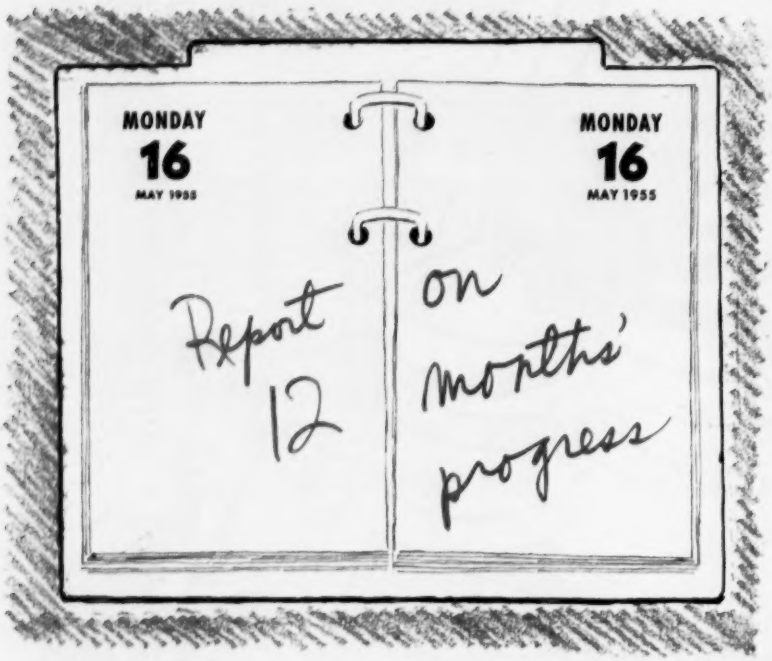
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Diary of Accomplishment

Since the first Chemical Progress Week just a year ago, a combination of inching steps and seven-league strides has brought the chemical process industries to new heights—in size, in technology, and in public recognition.

A few of these myriad advances were heralded in headlines; many of them were quietly recorded in academic journals; all of them together would, of course, fill book after book. On these two pages are sketched the highlights of a year's glowing progress.

And the forward march is by no means halted. On the following two pages is a sober, realistic appraisal of 1960's bigger and more productive industry—guideposts aplenty for the management man who must look beyond today's problems to tomorrow's plans.

But what of Chemical Progress Week itself? The CW Camera trained its lenses on Baltimore, pictures on the concluding pages how the local Manufacturing Chemists' Assn. committee is dramatizing the Chemical Progress story to the citizens of a typical city. Here, in microcosm, are emblazoned the achievements of many hard-working local committees, in many localities, throughout the nation.

DEVELOPMENTS marched continuously across the face of the last 12 months' calendar:*

May

Certain to have a tangible effect on the geographical pattern of the chemical process industries is the St. Lawrence Seaway, which was given the go-ahead by President Eisenhower just a year ago when he signed a bill authorizing U.S.-Canadian collaboration. Several years—at least five and possibly more—will elapse before the Seaway's impact is felt, but it will eventually turn the Great Lakes cities into ocean ports.

June

More and more, the Atom Age began to mean welfare as well as warfare. Brookhaven National Laboratory's David Ballantine proposed a mobile reactor, mounted on a railroad flatcar, for industrial use in initiating chemical reactions, controlling polymerization and altering the characteristics of polymers.

In a completely different area, June also brought figures from the Chemical Specialties Manufacturers' Assn. showing that aerosol products had racked up a 45% sales gain (1953 vs 1952) and that production had reached almost 140 million units. Among the aerosol-packaged products showing the most striking gains: hair lacquers, shaving creams, paints.

July

The heat of summer appeared to increase the pressure of multifarious problems besetting management. Two divergent trends characteristic of the chemical industry—integration and diversification—converged, in one sense, in that they both led to mergers. Hence attention was riveted on a report issued in July by the Federal Trade Commission outlining "Changes in Concentration in Manufacturing." The two yardsticks—number of employees and value of shipments—used by FTC in its analysis of various segments of the process industries don't provide *a priori* sanction or disapproval of a proposed merger, but they do indicate how FTC may regard it.

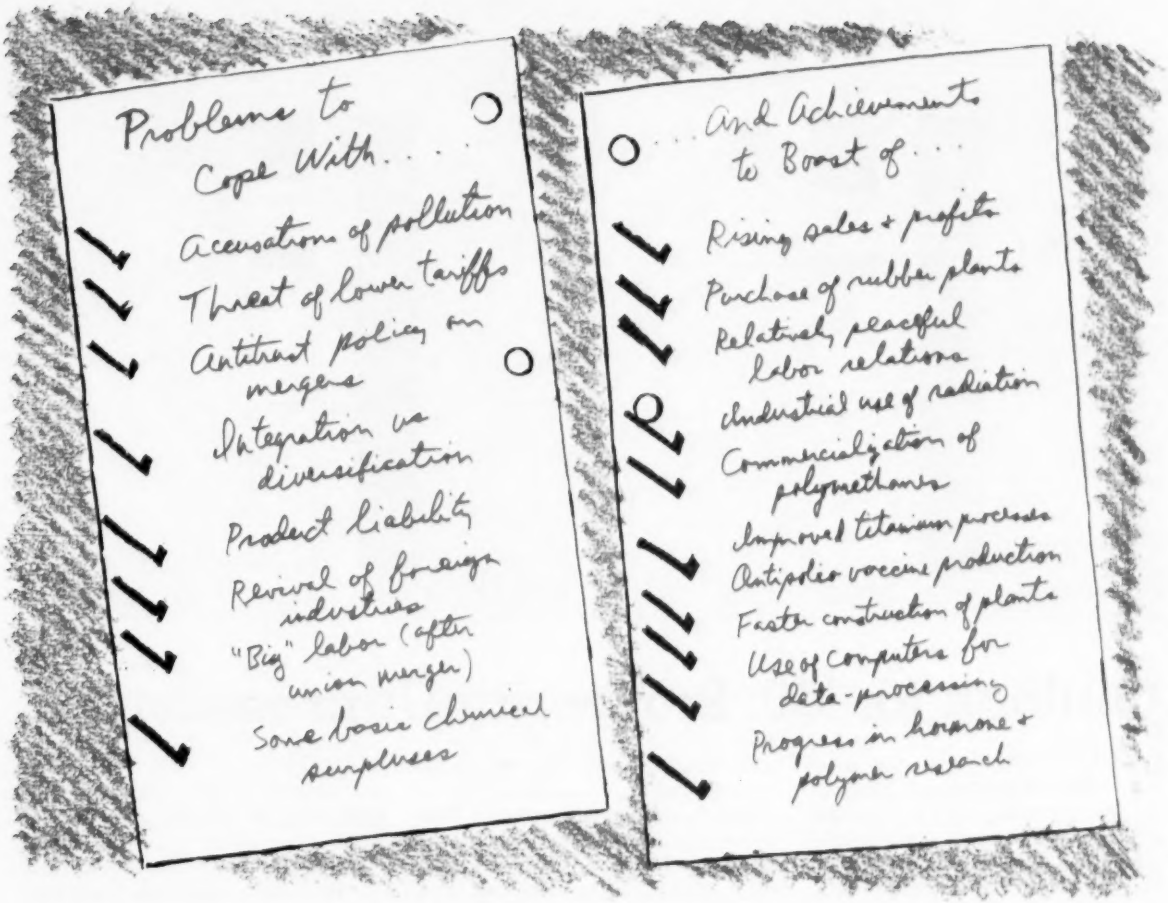
August

All during the year, as indeed throughout U.S. history, battle was waged between "free traders" and "protectionists." Either designation is too extreme to describe the position of most chemical industrialists, but the majority of them stress the threat, not only to their own operations but also to national defense, posed by resurgent foreign industries—e.g., Germany's and Japan's. By August, the Senate Finance Committee, as well as other governmental bodies, was holding hearings, and chemical groups made known their position.

September

Relatively new in the U.S. but coming along fast last year were the polyurethanes. Foams, fibers, molding compounds, adhesives, elastomers, films and coatings are all being made—either commercially or experimentally—with this new type of polymer, which may well turn out to be one of

* All reported, of course, in CW.



the more significant technical developments of the year.

Also vying to be included among the top developments were advances in titanium technology. In September were revealed the details of Shawinigan's patented electrolytic titanium process; the same month, other new processes were disclosed, as was the government's contract with Union Carbide for titanium output via sodium reduction.

October

The process industries maintained a fast expansion rate, and by the fourth quarter it was clear that engineering firms had speeded up their end of the job, slashing construction time 25-40% from 1950's average. How: easier-to-get materials, higher productivity, better planning.

November

Determination of ACTH's structure paved the way for an effectual attack on the synthesis of simplified protein modifications having the same or greater activity against arthritis.

December

Year's end highlighted a problem and a promise. The problem was pollution, against which restrictive legislation was advocated at federal, state and local levels.

The promise was a vigorous, competitive synthetic rubber industry under private ownership. Many of the plants had been sold before the new year; and by now, of course, the transfer is virtually complete.

January

Noteworthy are the continued inroads made by synthetics on the detergents market—especially the rapid rise of liquid products. It was estimated early in January that liquid synthetics during 1954 had gained 20% over the previous year—to an output of 115-120 million lbs. valued at $50 million.

February

Too much ammonia? The beanstalk-like growth of the nitrogen industry promises to boost capacity from a current 3.5 million tons/year to 4.3 million by mid-'56. Potential consumption is large enough, but it will take quite some time to build it up.

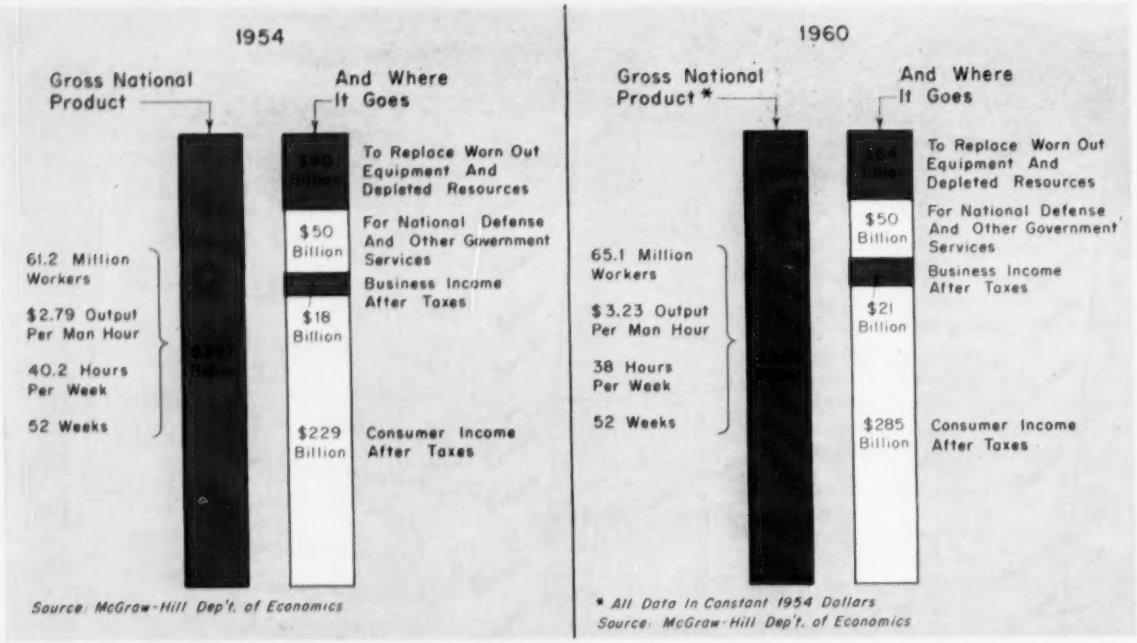
March

As 1954 annual reports rolled off the presses, it became evident that the year had been better than many prognosticators had anticipated. More companies than not (among the 26 surveyed by *CW*) showed higher sales and profits than during 1953; and first-quarter reports for '55 show even healthier gains over last year's first quarter.

April

Biggest news of April—and perhaps of the year—was the Salk polio vaccine. Despite the confusion surrounding it at the moment, it marks an advance in the battle against polio.

All in all, the industry can take pride in its past 12 months' accomplishments in meeting its problems and enlarging its usefulness.



Outlook for '60: Prosperity Unprecedented

UNDER A PANOPLY of restraint, chemical management is solid in its optimistic outlook for 1960. Chemical progress, they agree, is inevitably chained to the economic state of the nation, and, for better or for worse, must rise and fall with it. And the U.S. in 1960 should be riding on the crest of a wave of almost unparalleled prosperity.

Over-all dimensions of the nation's economy five years hence, as forecast at this week's meeting of the Chemical Market Research Assn., will be shaped by four key elements:*

- Total population.
- The proportion of the population in the working force—and at work.
- Amount of product per man-hour (or productivity).
- The length of the time the working force is on the job.

It's these last three factors, which up the gross national product, that by 1960 should be soaring close to $420 billion.

Most important element from an economist's view is how much workers produce. From 1930 to 1950, output per man-hour increased about 2% per year, but with further technological improvements the rate should jump to 2½%.

Too, total population gains (estimated to increase 12.5 million between 1955 and 1960) will have an immediate effect upon chemical sales. Due to increase most rapidly: the number of older people and children—under 15 and over 65—who fall outside the conventional age bounds of the working force.

Standing to gain: food makers, drugmakers; synthetic fiber producers.

By industry groups, here's what chemical producers themselves predict sales will be by 1960 (barring political intervention or the possibility of an atomic war):

INDUSTRIAL CHEMICALS should top $16 billion/year in sales value by 1960. Basic reasoning: millions of tons of chemicals today are used annually by every other major industry—and the total's growing. Products range from basic raw materials for other commodities to specialized chemicals; hardly a manufactured product can be made today that does not use chemicals—either directly or indirectly. More people means more consumers; thus there's actually no ceiling on how high the annual take of industrial chemicals can go.

PLASTICS will continue to find new uses in industrial and consumer application, and should pass the $3-billion annual sales mark within five years' time. Ticketed for the greatest growth rate: polyethylene, polystyrene, polyester resins, and silicones.

To a greater and greater extent, industry spokesmen maintain, production of plastics will come to depend upon the use of oil and natural gas; by 1960 the chemical industry should be consuming close to 2% of total U.S. annual production of petroleum.

SYNTHETIC RUBBER producers conservatively estimate that their sales by 1960 should be over $750 million/year.

PHARMACEUTICAL sales are in for a tremendous rise in the next five or six years, could be doing a $2-billion/year business by 1960. Biggest rise is sure to be registered by medicinals to promote good health, rather than disease-curing compounds. New antibiotics, synthetic hormones and new chemotherapeutic agents—all are scheduled to appear on the market within the next several years and will find wide acceptance with a consuming public that is becoming increasingly conscious of the possibility of controlling degenerative diseases.

* According to Dexter Keezer, Director, Dept. of Economics, McGraw-Hill.

SYNTHETIC INSECTICIDES could come close to doubling current sales figures and pass the $175-million mark by 1960. Reason: the necessity to feed America's expanding population will require a greater use of pesticides, weed killers, and similar materials. Loss to U.S. farmers today (says the Dept. of Agriculture) through weeds, insects and fungi costs every citizen about $5/month; that figure could be materially reduced by wider use of chemicals.

Better chemicals to control pests and minimize loss through rot and termite damage to wood will be produced, too. Reason: wood (for the next 50 years at least) will continue to be the primary material used for shelter and other construction. Today, over 20% of the annual cut made of U.S. dwindling supplies of timber (or 2 billion cu. ft. annually) is lost through insect damage and tree disease; only 2% is treated chemically.

Conservatively, industry leaders estimate, that figure can be increased 300-400% by 1960.

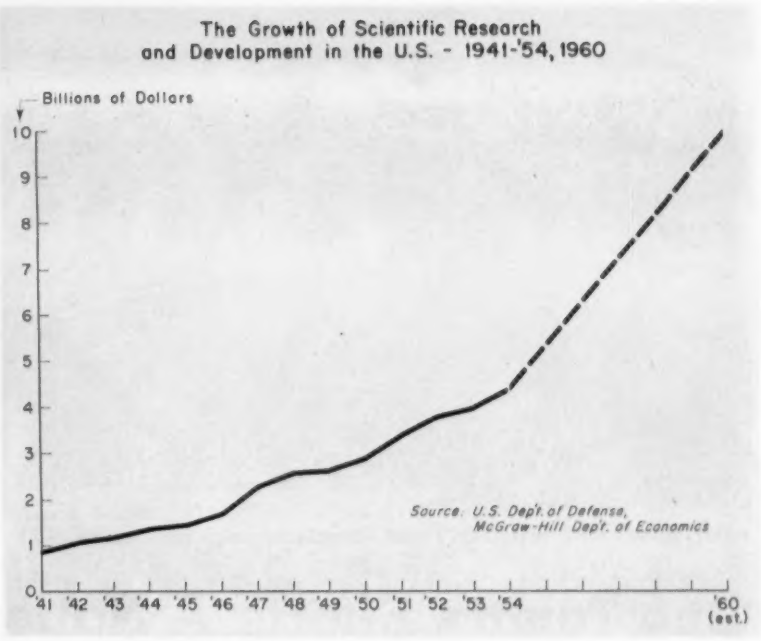
SYNTHETIC FIBERS, too, will find new markets, could easily rack up $2.75-billion sales by 1960. Research on a number of fibers will produce new properties, not available in natural fibers such as cotton and wool; U.S. producers will turn, more and more, to export markets to sell their higher-priced fibers.

Both industries—textiles and construction—will be demanding a host of other chemical products, too. Examples: dyestuffs (which should be doing an annual business of $250 million by 1960) and glass fibers (for a variety of construction materials).

CHEMICALLY PROCESSED METALS will continue to challenge chemical producers since one of the U.S.'s greatest single lacks today is an indigenous source of chrome, cobalt, nickel and tin. According to the President's Materials Policy Commission, need for titanium will be up 50-60% in the next five years, demand for cobalt will jump 65-70%, need for magnesium will soar 300%.

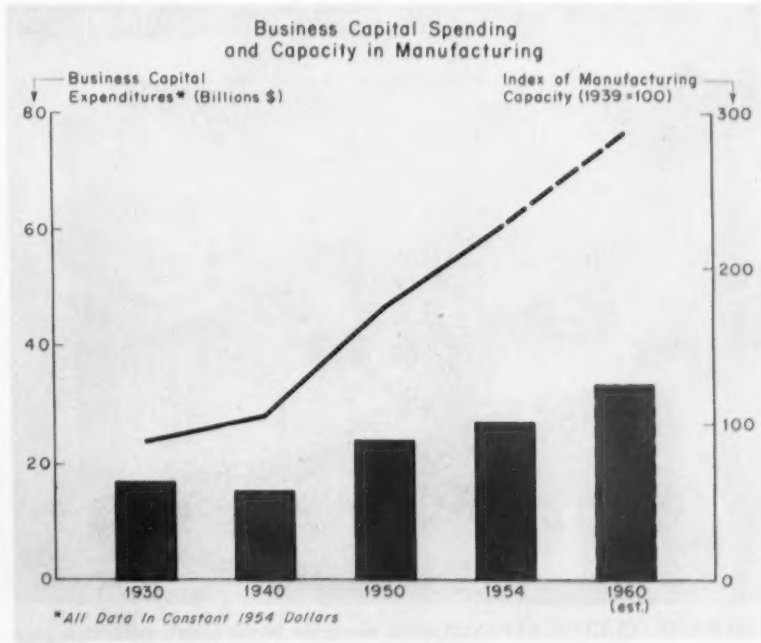
That means additional stress on developing replacement materials and extending available supplies.

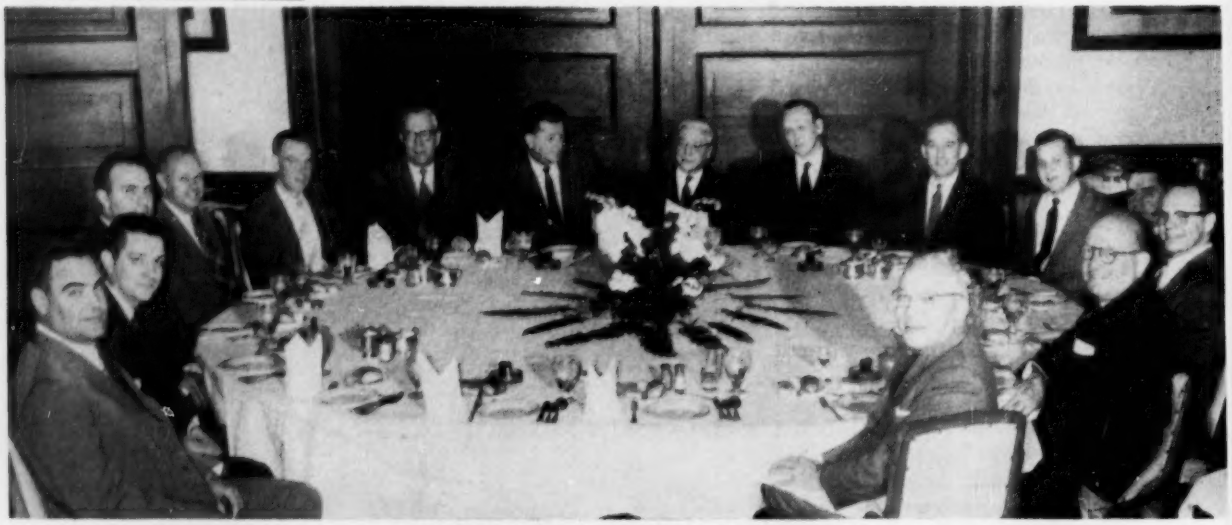
Corrosion prevention is another big field in which the chemical industry is sure to play a leading role. Direct loss from iron and steel rusting, at latest estimate, was over $2 billion/year.



SYNTHETIC DETERGENTS and surface-active agents are another sector of the chemical industry due for a big splurge in the next few years. The surface-active agent industry alone should be turning in well over $300 million in sales annually by 1960.

In summary, the chemical industry by 1960 should be enjoying unprecedented prosperity. With a more populous country, a richer country (with a total national product 18% above what it is today), a population more heavily weighted at the extremes of youth and old age, and a citizenry with more time on its hands to do as it pleases, the economic future borders on the flawless.





BALTIMORE CPW COMMITTEE:* Coordinate assignments, exchange ideas on how best to sell chemical progress.

One Town's Efforts: A Nation's Spirit

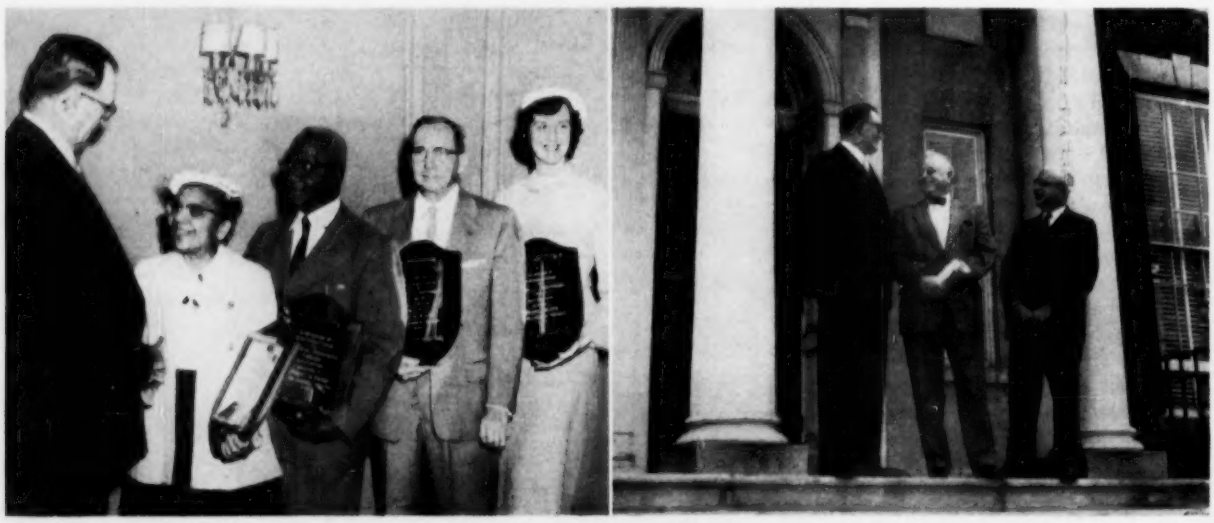
IN Baltimore, Md., this week, Chemical Progress Week is being celebrated in style. Reason: industry representatives there are proud of the part they play in the chemical industry of the United States; too, they want to pay tribute to their neighbors' cooperation and backing.

This, the second annual Chemical Progress Week, is a particularly apt time to take account of the year's progress. During 1954, the chemical industry took a number of significant strides forward (*see p. 34-35*), completed over $1 billion in new plants and facilities—which mean more jobs, more (and new) products for public.

Almost 20% of the total output value of all U.S. nondurable manufactures were turned out by chemical process companies last year; $1 out of every $12 of federal and state corporate taxes was paid by the chemical and allied products industries.

Baltimore chemical representatives, in their Week's celebration, are, however, playing down the cold but significant figures of their industry's growth. Instead they are telling their story to the public in down-to-earth terms, and stressing their appreciation of the community's cooperation in building (and supporting) chemical progress.

* Reading counterclockwise, upper left: CPW chairman Marlin Geiger, Davison Chemical; John Fitzgerald, CPW coordinator, St. Georges & Keyes; John Gourlie, Davison; J. H. Fall, Diamond Alkali; Winslow Hartford, representing Maryland Section, ACS; P. N. Shellenberger, Allied Chemical; James Fox, Olin Mathieson; R. D. Goodall, Davison; C. E. Smith, Du Pont; H. B. De Vinny, Davison; Robert Maples, Continental Oil; Larry Mayne, Food Machinery & Chemical; Dale F. Schwartz, Carbide; Robert Piper, Fisher Scientific; and George M. Worden, MCA.



EMPHASIS ON EDUCATION: Awards are made to educators, support is pledged to local colleges' science courses.



KICK OFF: Chemical representatives meet at luncheon with public and private high school educators.

Bow to Educators: Industry's debt to educators is a big plank in the Baltimore committee's program.

Among a score of other events planned in celebration of Chemical Progress Week, they have dedicated a new science building at Morgan State College (with Percy Julian as speaker), and will endow (courtesy of W. R. Grace) a professorship at Johns Hopkins University (*see cover picture*).

At a secondary school level, the committee (with the cooperation of the Board of Education) is awarding scrolls to science teachers, in recognition of "contributions to chemical progress through education."

Moreover, boy scouts are being taken on tours through company plants; television and personal appearances before Kiwanis and Rotary Club gatherings are being made by a panel of industry speakers.

At Loyola College (and other state colleges) meetings are being held to discuss career opportunities in chemistry; at Goucher College, a Miss Chemical Progress Week (Barbara MacHamer, a senior chemistry major) will be crowned.

Careful Planning: Behind such ambitious programming lie many long hours of careful planning. Armed with material of popular interest supplied by MCA headquarters in Washington, the Baltimore Committee started its actual preparations in early April by appointing chairmen to handle all phases of its activities. (Included: chairmen to handle school contacts, plant tours, speakers, literature, etc.). Masterminding the over-all plan: CPW Chairman Marlin Geiger and campaign coordinator J. L. Fitzgerald of St. Georges & Keyes.

On a nationwide scale, the same types of programs are being carried on in every major city from coast to coast. Holding educators' luncheons: committees in Chicago, St. Louis, New York, Cincinnati, and Seattle.



SALES LITERATURE: Brochures, booklets, numerous displays for store and office windows.



SUPPORTS INDUSTRY-PUBLIC MEETINGS: In the classroom (upper left), on television broadcasts, with boy scouts (lower left), and between Maryland's Governor McKeldin and industry representatives.

Among those promoting special CPW luncheons or dinners not limited to educators: Charleston, W. Va., Providence, R.I., Pittsburgh, Denver, Chicago, Buffalo, Los Angeles, and Washington, D.C.

In all, MCA officials estimate that there are 2,000 industrial representatives of Chemical Progress Week spotted throughout the country; their combined efforts should reach out to all 48 states.

Hundreds of touring speakers are going out to the grass roots; others (including Pfizer's McKeen, in Providence, Oronite's Parkhurst, in Los Angeles, Cyanamid's Swain, in New Orleans, and MCA's Foster, in Chicago, St. Louis and Denver) are making major addresses in the larger cities.

In New York, the annual spring meeting of the Chemical Market Research Assn. this week is linked with the celebration of Chemical Progress Week, is the occasion for release of a look-ahead at the chemical industry of tomorrow. And in Washington, MCA representatives are working with officials of Armed Forces Day in a joint effort to spell out the industry's importance to the peacetime economy of the United States.

On a coast-to-coast network (over NBC), CPW is promoting a radio broadcast ("What's Next") including a "plant tour" of Dow Chemical's units at Midland, Mich. And for television audiences, MCA is releasing a special five-minute film titled "Chemicals are Fashionable."

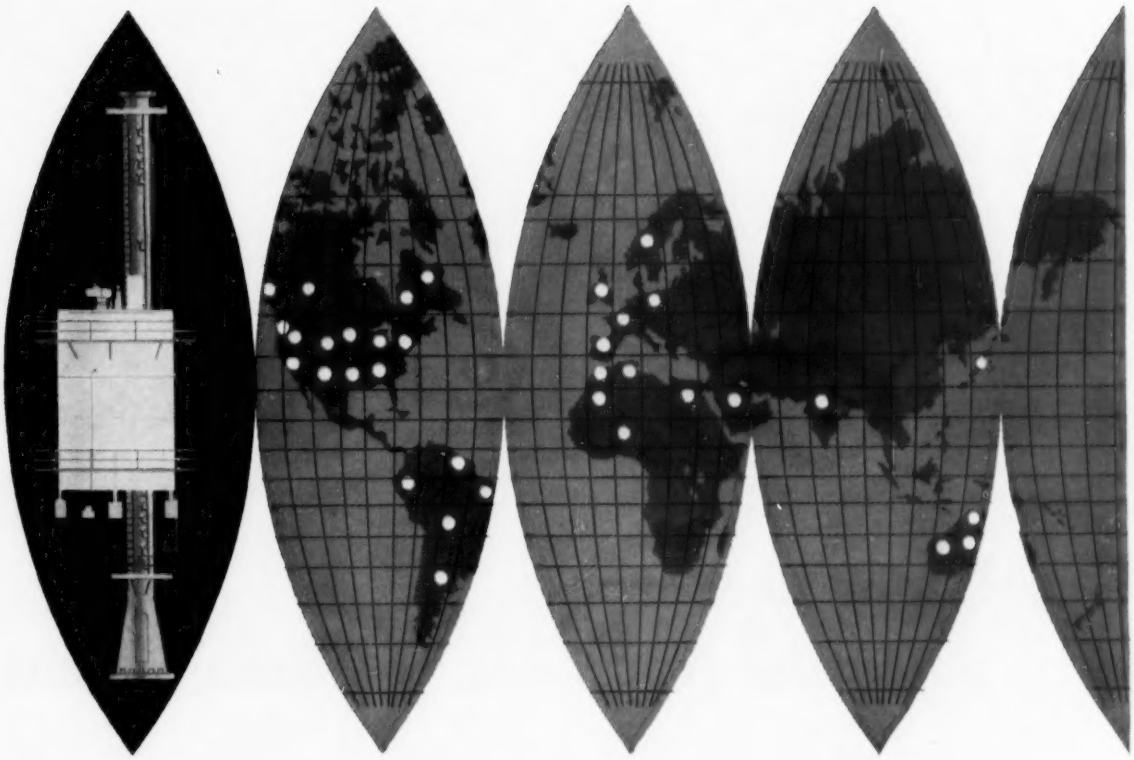
Fisher Scientific Co. is dedicating its new Fairlawn, N.J., reagent chemicals plant on May 17; Du Pont is tying in its 50th anniversary of operations at Gibbstown, N.J., with CPW festivities.

As an unusual twist, the Ohio state committee is holding a High School Editors' press conference at which industry representatives will try to spell out opportunities in chemistry for teen-agers.

From Washington headquarters, 100,000 copies of the second edition of the "Chemical Industry Facts Book" will be mailed out to science teachers (at all levels), to school libraries, and to various "opinion-molding" groups—such as state legislatures, Congress.

Main theme of the week's activities, however, is the importance of educators to the future growth of the chemical industry. Recognizing the fact that in today's classrooms sit industry's leaders of tomorrow, chemical men everywhere are pitching in to show their awareness of education's role.

On cover, left to right: Charles E. Wilson, W. R. Grace's board chairman; Dr. Lowell J. Reed, president, Johns Hopkins University; and Marlin G. Geiger, president Davison Chemical Division, W. R. Grace.



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CW Report

by Martin Goland and Ernest Koenigsberg

DRAWINGS BY GORDON DRAPER

Operations Research: Scientific Approach to Management

Executives, who often had to rely on seat-of-the-pants decisions, now have a new navigational aid. It's called Operations Research.

An applied science, OR substitutes scientific exactness for guesswork, circumvents the costly hit-or-miss approach.

It's all done with models set up to simulate actual operations. Turn the crank, and the model will show what effect a move will have *before* it is made.

But it takes training to turn the crank and read the results, and right now there's a shortage of skilled personnel—even while their number is rapidly increasing.

Within 10 years, every big company is expected to have its own OR team; but for the nonce, consulting and research groups are taking most of the available specialists.

From within the plant comes the soft hum of electronic controls swiftly and carefully running process lines, checking results, and, in some instances, even correcting mistakes. Lost beneath the hum, from within the front office comes the buried sigh of the policy-making executive who must meet schedules set by the whirring controls. His job today is, if anything, more difficult than ever: he has more decisions to make and less time to make them in.

To help the executive shoehorn his decisions into this shrunken evaluation span and at the same time reach scientifically sound solutions of some of his most complex operating problems, groups of scientific specialists recently originated a new management advisory service called Operations Research (*see box*: What Is Operations Research?). Even while its position in the executive echelon is being carved out, the group has already clearly drawn its objectives.

On Target: Essentially, operations researchers hope to make the scientific method standard practice at all levels of decision-making. They have already reached into a number of chemical process plants; and, among other things, have helped establish sound policies on sales, shipping, standards, scheduling, processing and inventory control, communications, clerical work, advertising, and the like.

Using Operations Research, executives have been able to cut waiting lines at tool cribs, loading terminals, and cafeterias; to effect optimum balance between inventory levels and production schedules, capital costs, and customer service; to speed up interplant communications by increasing transmitter efficiencies. Operations Research has also helped minimize production costs in the face of fluctuating markets through optimum scheduling; it has directed promotion dollars into channels of maximum return, sent salesmen to the right account at the right time. Too, through analysis of processing operations, it has increased yield, decreased waste.

To chemical management, all this means unprecedented speed, soundness and savings in any decision it makes touching upon almost every aspect of its multifold operations. In one raw material operation, OR upped yield 40-50%; at one terminal point, it increased loading rate by 50%; in one fermentation operation subject to frequent "crash" activity, it cut wastes, overages and shortages, reduced inventory level 50%, and boosted net

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OPERATIONS RESEARCH is the scientific approach to management problems.

C W Report

in come 30-100% just by setting production equal to twice the maximum sales.

Management Stands: An inevitable outgrowth of this new control age, Operations Research is a sort of super-control that directs the other controls, coordinates the other applied sciences. But far from being pushed into a sinecure, the man in the front office remains as important as ever. OR is strictly an executive advisory service; all it can do is reduce a problem to its workable components, and provide management with a scientific analysis of the cause-and-effect relationships involved.

The executive must still blend this scientific appraisal with such things as morale, psychology, politics, and other factors that fall outside OR's scope. He still must make the final decisions, decide how the report handed him by the OR group can best be used. Adeptness in decision-making and management skill will continue to be the foundation of executive success; now, however, the executive no longer has to rely on costly hit-or-miss trials. Rather, he will often be able to switch his problems to a clinical OR group, transfer many "decision functions" to their shoulders.

Moreover, since Operations Research deals in causal interpretations, obviously only those problems pertaining to cause-and-effect relationships can be handled with much success. At present, there are many situations that can't be analyzed or measured and in which OR is now of little practical value. Too, not all quantitative problems can as yet be solved by OR.

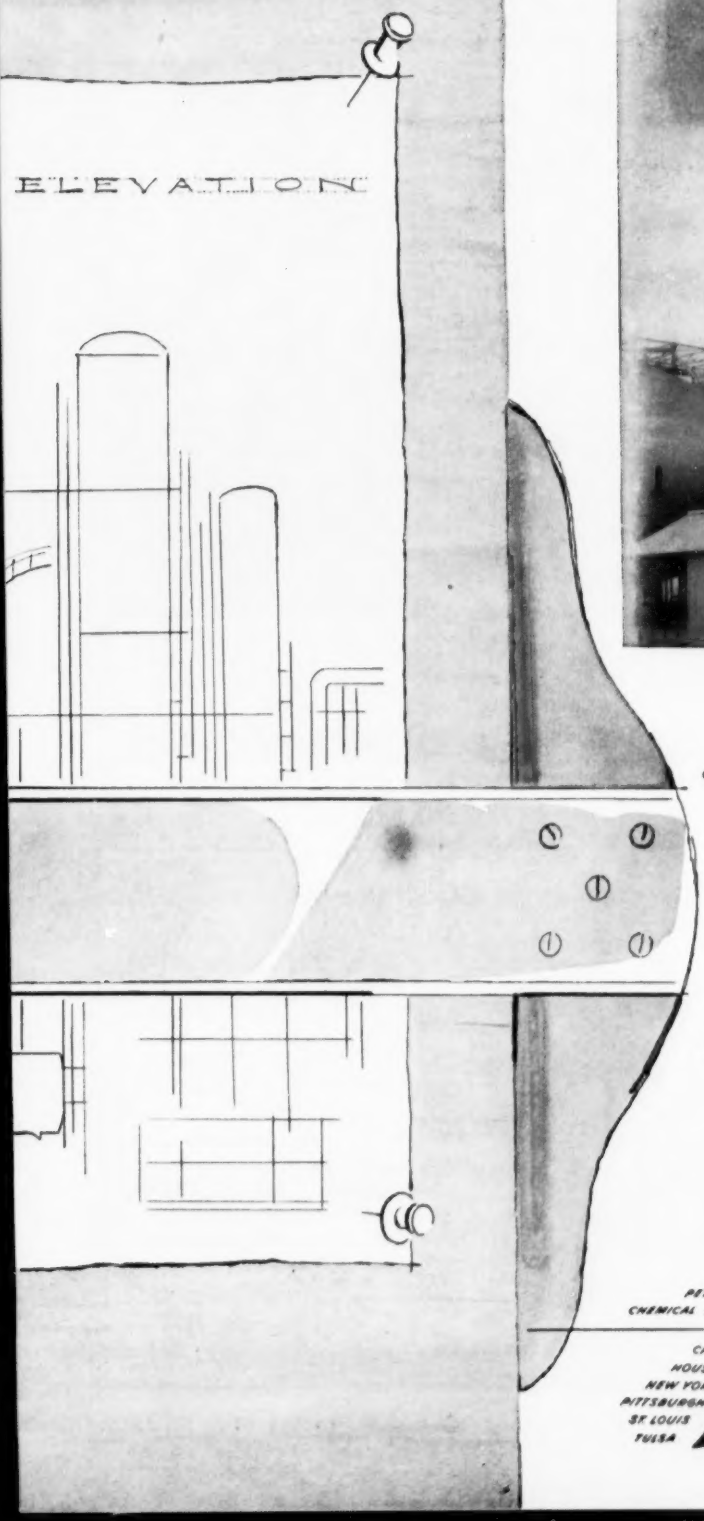
Tools and Techniques: Dealing specifically in the scientific method, Operations Research returns naturally to the sciences for both its methodology and its implements. Itself an applied science, OR borrows its techniques from all the basic sciences. For its chief tool, the model (*see box:* Guidebook to Operations Research), it turns particularly to mathematics.

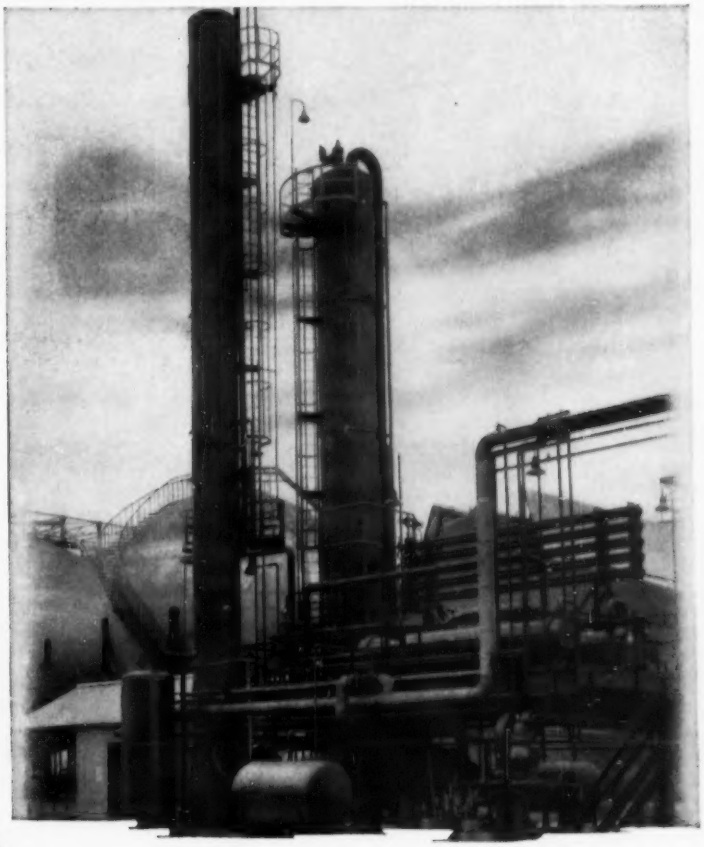
Operations researchers found that such logics as linear programming, Monte Carlo method, statistics, queuing theory and game theory can be used to describe mathematically a real situation, can be further used to predict outcomes of alternate courses of action applied to the situation.

At a transport firm, a waiting line (queuing theory) model was set up to show the characteristics of a truck-

COOPERATION ALL THE WAY

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loading terminal; e.g., arrivals, departures, servicing times, loading operations. The model was then operated to "service" trucks under different loading conditions, real and imaginary. Clearly and accurately, the model showed what was happening, what would happen if facilities and procedures were changed, and the best way to eliminate the bottlenecks (*see box*: Breaking the Bottleneck).

In this area, of course, there are other types of models; for example, the conventional physical model used by engineers (the aerodynamic test-model airplane used in wind tunnels), and the conventional model used in an unconventional way, like the hydrokinetic model suggested for application to problems in mass advertising, where sales would be fluid flow and advertising would be forces acting on the fluid. But for the nonce at least, most operations researchers are sticking to the mathematical models.

Mathematics and Models

A glance at available literature shows that Operations Research in this country relies heavily on mathematics.



IT SHOWS management the best way to spend its money.

Many feel that the role of mathematics has, in effect, been highly overemphasized; they point to numerous results obtained mostly by nonmathematical anaylses. At the same time, others believe that not all the higher mathematics have been thoroughly explored for possible OR applications, suggest that future efforts be directed along this line.

In any event, it is evident that mathematical theories do play an important, if not exclusive, part in current OR practice. They accept basic concepts, permit their generalization and exploration. But, it must be remembered that mathematics does not correct for false suppositions, does not and can not generate its own hypotheses. The success of Operations Research rests on the skill with which the conceptual framework is constructed, on the care that is exercised in checking the correctness of the hypothesis.

As for the models themselves, in essence, they came into being some time ago. For working purposes of Operations Research, they are generally reduced to two groupings:

- Deterministic (or exact) model. This type is used in operations where

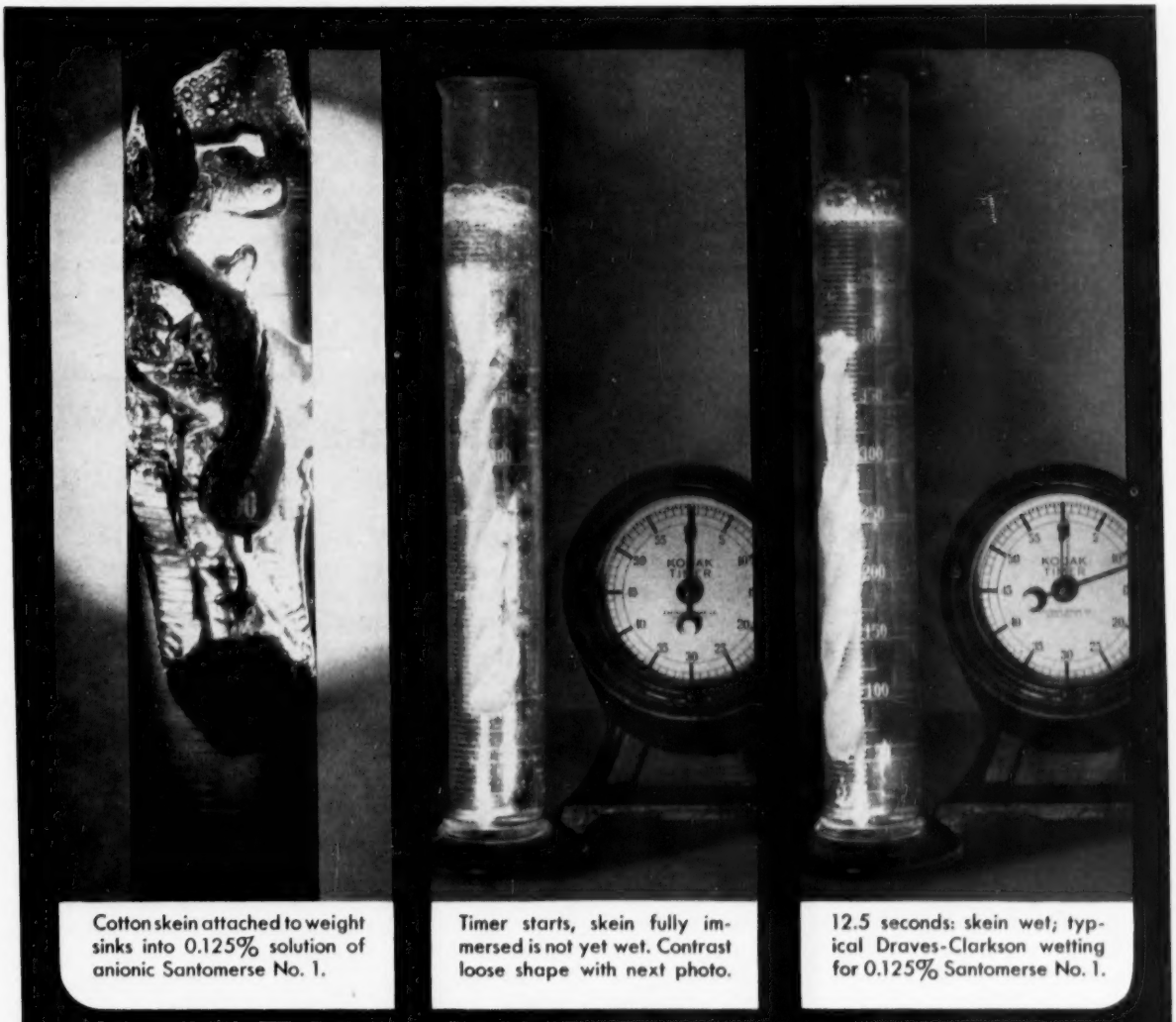


Meet the Authors

Martin Goland (*left*) and Ernest Koenigsberg, both active operations researchers, approach their subjects with a facility born of familiarity.

Goland, formerly Midwest Research Institute's Director for Engineering Sciences, recently became vice-president of Southwest Research Institute.

Koenigsberg, Senior Project Physicist at Midwest Research Institute, came to MRI from Iowa State College where he received his doctor's degree. Behind him is a long trail of work and published articles on solid-state physics.



Cotton skein attached to weight sinks into 0.125% solution of anionic Santomerse No. 1.

Timer starts, skein fully immersed is not yet wet. Contrast loose shape with next photo.

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variables are controlled, chance plays a small part, and the effect of any given action can be closely gauged.

• Stochastic (or probabilistic) model. This model takes cognizance of uncertainty, is used in operations where not all the variables are controlled, and the effect of any given action varies in a random manner.

In actual application, of course, the broad categories are further refined, separated into several distinct theories, which, in turn, may have to be modified to fit the specific problem under study. Here are some of the specific theories of the greatest potential interest:

Linear Programming: Part of a much larger discipline called mathematical programming, linear program-

What Is Operations Research?

Some people call it scientific common sense. Others describe it as a scientific philosophy. All agree on its fundamental scientific nature. As used in this report, Operations Research is the name applied to the scientific study and analysis of management problems aimed at maximizing or optimizing effectiveness of a company's over-all operation.

To study and analyze these problems, the operations researcher draws upon the methods of the basic sciences, the results of the applied sciences. His chief tools are mathematics, the experimental model, observed data, and objectivity. His subject is company operations; not one particular phase of operations, but total operations considered as an integrated economic unit. His goal is the company's goal: the most effective total operation. Validity of his results is the validity of the scientific experiment: Can it be repeated? Or as a corollary, can it be used to predict future courses of action?

How It Works: The basic assumption of the operations researcher is that all effects have corresponding causes. He uses intuition, common sense, judgment and technical skill to reduce data to its workable components, wherein he seeks the key to understanding the fundamental mechanism of the operation.

The operations researcher then formulates a tentative theory (if it doesn't prove out, he starts out again from scratch) to explain the observed action pattern. This is where the experimental model comes in: it is generally a mathematical representation of the operation under study, slimmed down to its pertinent characteristics. This model (or theory) must be a valid representation of the observed data, must be able to explain the observed data, and must serve to predict what will happen.

Building this model is the operations researcher's principal and, perhaps, most difficult task. Using this model, the operations researcher is able to predict outcomes of alternate courses of action, recommend the particular course best suited to the company's objective.

What Its Role Is: Operations Research is an advisory service for management. It provides the executive with a factual, objective analysis upon which he can base policy-making decisions; it does away with most of the guesswork.

Like the executive, Operations Research is concerned with immediate problems. Very often, it arrives at the same conclusion as the experienced executive. But at no time does it serve as a substitute for policy-making management.

Unlike the executive, the operations researcher does not operate on a schedule, cannot guarantee meeting particular objectives within predetermined times. Moreover, he must work within a cause-and-effect framework, and from this framework must be able to fabricate a valid and representative hypothesis (model) that will stand up under critical examination and experimentation.

Too, the interest of the operations researcher in a particular problem does not terminate with the solution of the problem at hand. To be successful, he must go beyond simple solutions, establish a basis for understanding an entire class of related problems. As the engineer applies the same laws of design to buildings, machinery and airplanes, the Operations Research scientist arrives at general principles that are equally applicable to problems in sales, production, inventory and customer service.

As for its place among other management services, Operations Research serves as an adjunct to, not a substitute for, services such as research, market research, statistics, accounting, production control, inventory control. Operations Research draws upon information from all these fields, calls upon the services of all company specialists, and at the same time, cuts across all lines of authority, in sublimating the objectives of subgroups to the over-all objective of the company.

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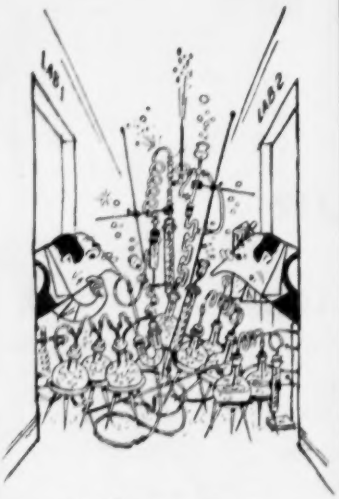
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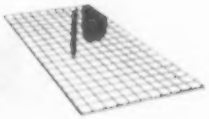
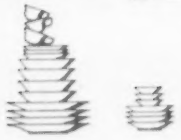
OPERATIONS RESEARCH is an executive tool, not a substitute.

C W Report

ming (LP) is used to find the optimum relationship between a number of interdependent variables where the interrelationships are algebraically linear. For example, a specialties company has orders for 25 different products, has 5 reactors available for limited periods. Each reactor can be used for all the orders, but batch time (this is known) for the same product varies from one reactor to another. Set up for these specific conditions, an LP model will show which orders should be scheduled for what periods in each reactor to obtain a minimum total reactor time. In much the same fashion, linear programming can be used to establish optimum production schedules, find most profitable product mixes, allocate sales promotion dollars for most profitable returns, divide work for lowest labor cost, route a trucking fleet through a network of warehouses, etc.

Moreover, once the programming procedures are established, the answers are obtained by routine calculation and the whole operation can then be turned over to a nonmanagement group, requiring only a nominal amount of management supervision.

A comparatively new tool, linear programming has advanced further than the other branches of this mathematical discipline, but is still much limited. Sample restrictions: relationships must be linear, of course; and not subject to random fluctuations; input-output relationships must be known. Nevertheless, linear program-

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ming has already proved itself a valuable tool in the hands of an Operations Research group.

Queuing Theory: Like linear programming, queuing theory is a division of a larger discipline—in this case, theory of probability. Generally, it is used to unknot those situations where valuable time is being lost through waiting (*see box,* Breaking the Bottleneck). Most of these situations are characterized by a high degree of repetition and chance. In essence, queuing theory can be used on any operation in which units arrive at some point in an irregular, nonscheduled manner and are passed on to some other point at a different rate.

Monte Carlo Method: Based on the law of probability, the Monte Carlo



IT CAN BE USED wherever valuable time is lost in waiting

Where Operations Research Can Help You

If the problem is in . . .	Operations Research can show you . . .			
Marketing	how much to spend on sales promotion	the best way to allocate your sales promotion dollar	when to send salesmen to individual accounts	the best incentive system for salesmen
Production	how to schedule equipment for minimum operating time	how to combine raw materials for maximum yield	how to set up schedules that reflect current market conditions	how to increase process efficiency
Advertising	the best way to spend your advertising dollar	effectiveness of your advertising program	how to plan a sales campaign	how to analyze consumer buying
Maintenance	how to estimate equipment efficiency	the best point at which to replace equipment	when to service equipment	how to reduce corrosion (with technical assistance)
Shipping	how to eliminate backlogs	how to eliminate tie-ups at loading terminals	the best way to operate a pipeline	where to locate production for lowest shipping costs
Communications	how to design the most efficient communications network	how to minimize paper work	how to speed up interplant communications	the best way to code data
Inventory	how to maintain most profitable balance with production	how to dispose of an inventory most profitably	what lowest inventory will satisfy production needs	when and what to order
Research	how to design experiments	how to plan research	how to best apply findings	how to evaluate new techniques
Administration	how much work should be done in how much time	when to work overtime	how to assign work to minimize labor cost	how to best word contracts
Warehousing	how to design plants for minimum material handling	how large the warehouses should be	how to supply warehouse network at minimum cost	how to schedule material flow for minimum handling

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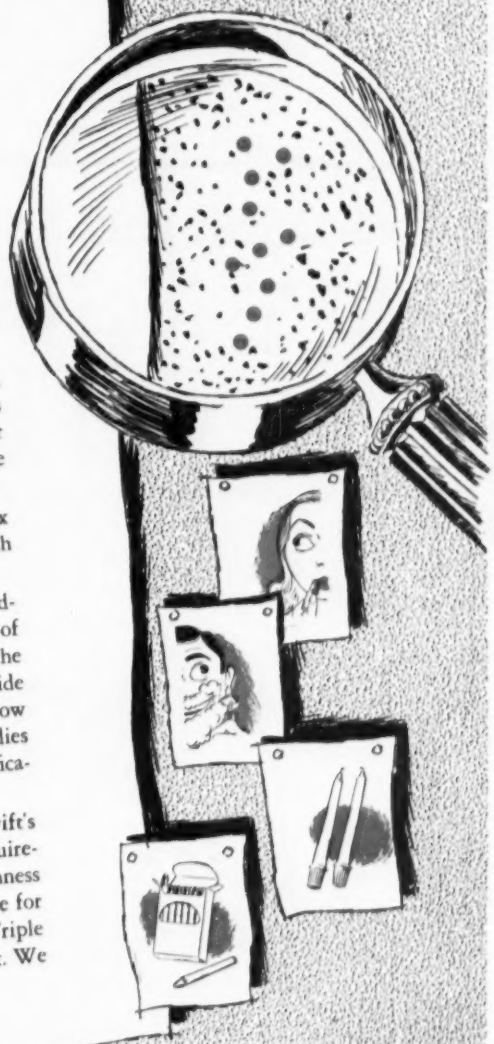
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C W Report

method works through random sampling. To simulate a real situation, more often than not, this technique, which involves performing a multitude of simple calculations in a random way, makes the use of an electronic calculator almost imperative.

Many of the problems solved by this method can also be worked by more rigorous analytical methods, but would involve solving rather complex and difficult equations. Moreover, the Monte Carlo method can be used in spots where equivalent analytical methods haven't yet been fully developed; and, with a computer, can be used to solve problems in three or more dimensions.

Among possible applications of this method are those in certain problems

Breaking the Bottleneck

In some one of its many forms, the sample queuing model detailed here has already been put to work cracking bottleneck problems of every type—from cafeteria waiting lines to the stacking of airplanes above terminals in foul weather.

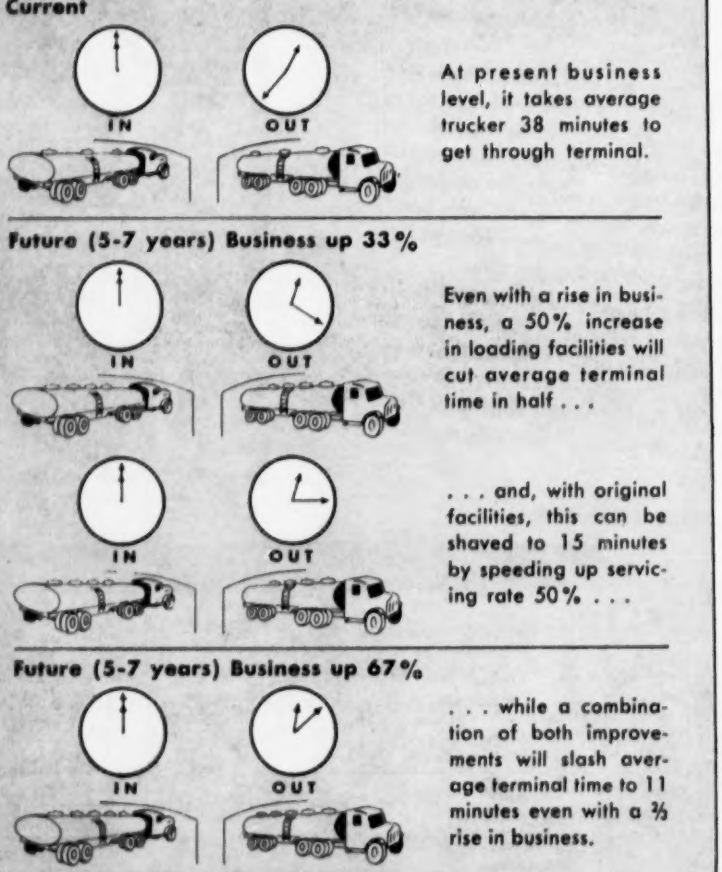
In a fairly complicated (mathematically) form, it went to work as a loading depot, where tank trucks are filled with processed products on a round-the-clock schedule, in order to (1) smooth out some kinky, costly and tiring truck delays, and (2) find the best ways to meet future growth in activities. As it stood, the terminal had adequate facilities for current business (mean loading rate was less than average arrival rate), but the random nature of arrivals (50% of the trucks arrived during the peak 8 hours) caused waiting lines to form. It took the average trucker almost 40 minutes to get through the terminal (*see left*). Further study revealed that a 33% rise in business would make the terminal inoperative altogether.

Scheduling was out of the question since the truck owners (no trucks were owned by the terminal operator) were opposed to it. At this point, an Operations Research group was called into action, after some weeks of study set up a mathematical model to simulate terminal operations—as they were and as they would be 5-7 years hence (assuming normal growth rate of terminal business). Among other outcomes (*see left*), the model showed that (1) a 50% increase in loading facilities (from 4 to 6) could accommodate anticipated growth, at the same time cut average terminal time from about 40 minutes to about 20 minutes; (2) a 50% speedup in servicing rate (through modified loading procedure) would do the job, require no major capital investment, and cut terminal time to about 15 minutes, and (3) a combination of 1 and 2 could handle a 67% increase in business, at the same time keep the average trucker at the terminal only about 14 minutes.

Modified Model: To show just how a queuing model is set up, this actual terminal study can be much simplified, mathematically, by assuming that only one (instead of four) loading facility is involved. (It must be remembered that the following formulas are restricted to this particular case.)

Terminal Tie-up

Mathematical Models Move More Trucks Faster



of solid-state physics. Of more significance to management is its possible use in planning sales campaigns, working out scheduling problems in production, estimating equipment efficiency, and in designing sales and production experiments.

Statistics: This is, perhaps, the most commonly used Operations Research tool at present. It touches upon almost all problems; in a sense, it encompasses most of the other OR techniques. For operations researchers, statistics is the means of screening and signifying the mass of data with which they must work.

Statistics has been serving management, in fact, since long before the term Operations Research was coined, keeping records, setting standards (*CW, March 5, p. 46*), checking quality (*CW, Dec. 18, '54, p. 80*), etc. Among some of the more important new developments in this field are the statistical design of experiments and econometrics, wherein mathematical models of economic situations are mocked up to show effect of changing factors.

But while statistics is one of the oldest techniques, it is also one of those that are most rapidly changing. A real possibility here, warns one statistician, is that the scientist using statistical methods just a few years old may find them already outdated.

Symbolic Logic: Reserved for specially complex situations whose true significance is bogged down in a morass of multiple entendre, symbolic logic is a sort of generalized mathematics in which symbols and rules of logic are substituted for words. One of the more familiar forms this tool takes is Boolean algebra.*

Here, statements, assumptions, and the like are assigned certain letters: words—such as no, not, if, and, or, expressing the relationship between the statements – are assigned algebraic symbols. Working these statements by certain formal rules of logic then reveals inconsistent or illogical expressions, brings to light the true meaning of the situation.

One of the obvious applications of symbolic logic is in the wording or interpretation of involved contracts. It has also proved helpful in the analysis of office operations and in the design of electrical circuits.

Game Theory: One of the newer techniques, game theory deals in strategy of competitive play. The objective is not so much to outguess the opponent as it is to play the game so that no matter what move your opponent makes, you end up with the lowest possible loss.

So far, game theory has been used mostly in solving military problems. Practical applications haven't yet carried beyond the simple zero-sum, two-person game where wealth is merely transferred, not created or destroyed. It is a valuable tool in analyzing certain situations, mapping out possible moves an individual or his opponent might make, pointing out the most

---

Once an Operations Research team is sent into action, its first move is a detailed study and analysis of the terminal operation to determine service time distribution, mean values of service time and service rate, arrival rate distribution, average arrival rate, set-up time, fill time, and flow rate. From these characteristics, the OR group can then fabricate a mathematical model of this particular terminal.

Here, for the sake of manageability, all these characteristics are assigned letters and numbers: A, number of trucks that arrive per hour at random; S, average number of trucks serviced per hour (service time is not constant, but is distributed about a mean value of $1/S$ hours per truck since trucks vary in size and number of compartments and human factors are involved); P_n, probability that there are n trucks waiting in line when the next truck arrives (e.g., if n equals 5 and P_n is large, this means that it is quite likely that there will be 5 trucks in line ahead of it, when the next truck arrives); SP_1, rate of creation of a line of zero length (i.e., service rate x probability that waiting line has only one truck in it); AP_0, rate of disappearance of a line of zero length (i.e., arrival rate x probability that there is no waiting line. This must equal SP_1.); $A/(S\text{-}A)$, average length of the line; $1/(S\text{-}A)$, average time a truck spends at the terminal.

Moreover, it is assumed in this study that the service rate S is greater than the arrival rate A (otherwise the waiting line will grow without limit), and that there is a steady state (i.e., probabilities, P_n's remain constant and do not change with time). Nevertheless, due to random nature of arrivals and service, waiting lines will still form.

Expressed mathematically:

$$AP_0=SP_1$$
$$AP_0+SP_2=(A+S)P_1$$
$$AP_{n-1}+SP_{n+1}=(A+S)P_n$$

These equations then resolve into the following model:

$$P_n=(S-A)(A^n/S^{n+1})$$

The object is to make P_n small for n greater than some critical value; i.e., make it very unlikely that any more than, say, two trucks are waiting in line when the next truck approaches the terminal.

Using the Queue: Assuming, for the sake of simplicity, that 2 trucks arrive at random each hour and that 3 can be serviced each hour:

$$P_2=(3-2)(2^2/3^{2+1})=4/27$$

Under these conditions, it is fairly unlikely that there will be more than two trucks waiting in line when the next truck arrives. But, if the servicing procedure were modified to accommodate 4 trucks per hour, the probability of more than a two-truck waiting line is even more unlikely:

$$P_2=(4-2(2^2/4^{2+1})=1/8$$

Moreover, there is, obviously, a direct relationship between the mean length of the waiting line, $A/(SA)$, and the ratio of service rate to arrival rate, S/A. As revealed by the mathematical model, improvements in servicing will have the following effects:

S/A	$A/(S\text{-}A)$
1.05	20
1.10	10
1.25	4
1.5	2
2	1
5	¼

At this point, the Operations Research team might turn the results over to management for evaluation and decision. For the hypothetical terminal executive, the most significant observation might be that the average waiting line won't drop below one until the terminal can service at least twice as many trucks in an hour as arrive (at random) every hour. Other important results: the model can show the effects of increased business (smaller S/A) on waiting times, evaluate reductions in waiting time balanced against increased costs or greater capital investment required to secure such reductions.

* Named after its originator, George Boole, a 19th century English mathematician who felt that "life was too complicated for words" even back in the last century.

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favorable action, etc.; but it will have to be further developed before it finds wide industrial application. With further work, many operations researchers believe it will prove invaluable in outguessing competition.

These are just a few of the many interesting mathematical tools adopted and adapted by Operations Research to solve some of management's most difficult problems. There are others; and like any skilled craftsman, the operations researcher often must use a combination of tools to solve a problem. (Here, of course, situations and models were both greatly simplified for the sake of clarity.) Many times the operations researcher's scientific training and imagination prove to be his greatest asset.

Setting Up Shop

Top management of several big chemical process companies are already using Operations Research. Du Pont, Atlantic Refining, Olin Mathieson, Sun Oil, and U. S. Rubber, for example, have fielded their own OR teams. Others such as Celanese, Commercial Solvents, Armour, Minnesota Mining & Manufacturing, International Mineral, and Schenley Industries are either making use of the service or seriously contemplating doing so. And even more companies outside the process industry are likewise interested in or actually using Operations Research. It's likely that within 10 years almost every large business and industrial firm in the U.S. will be using this management service in one form or another.

Scientific Squeeze: The very qualities that make an effective OR composite—scientific inclination, background, creativeness, aggressive interest in operational problems, tact, ability to work with others, industrial experience—at the same time are so limiting as to affect the supply of trained OR personnel. Thus, amid this fast-growing demand rises an equally fast-growing drought of trained people. Fortunately, however, more and more people are entering and being trained in this field; and eventually there should be enough personnel to go around.

Many of the trained personnel are being utilized by consultant and research groups, which were among the first to recognize the industrial implications of this new tool, and at the same time, among the best suited to fit out an OR team with the different technical specialists required. Thus, it is to these groups that most companies are now turning for this service.

Choosing a Consultant: At present, choice of an outside research group is rather restricted. Not counting the small OR teams operating out of colleges, for example, the firms offering this service number fewer than a dozen. Among them are such organizations as Midwest Research Institute (Kansas City, Mo.), Stanford Research Institute (Palo Alto, Calif.), Alderson & Sessions (Philadelphia), Armour Research Foundation (Chicago), Arthur D. Little (Cambridge,

Quick Guidebook to Operations Research

Econometrics: A mathematical model of an economic situation.

Game Theory: A method of selecting strategy that will minimize a player's loss.

Law of Probability: One part of this law states that if enough samples are taken at random, the composite effect will closely approximate the over-all pattern from which the samples were drawn.

Linear Programming: The theory by which activities—independently variable and subject to certain restrictions—related to each other in linear fashion (such as the steps in a cracking operation) are arranged to obtain maximum results.

Monte Carlo Method: A method of using random sampling (based on the law of probability) to simulate a real situation so that test conditions can be dry-run, or complicated analytic equations can be bypassed.

Model, Mathematical: A group of equations that describes an actual operation mathematically, and can be manipulated to show what effects a given change will have.

Model, Deterministic: A mathematical model in which chance is only a minor factor and can be controlled by manipulation.

Model, Exact: Same as Deterministic.

Model, Game: See Game Theory.

Model, Hydrokinetic: A physical model used by engineers to study the effects different forces have on the motions of fluids.

Model, Probabilistic: Same as Stochastic.

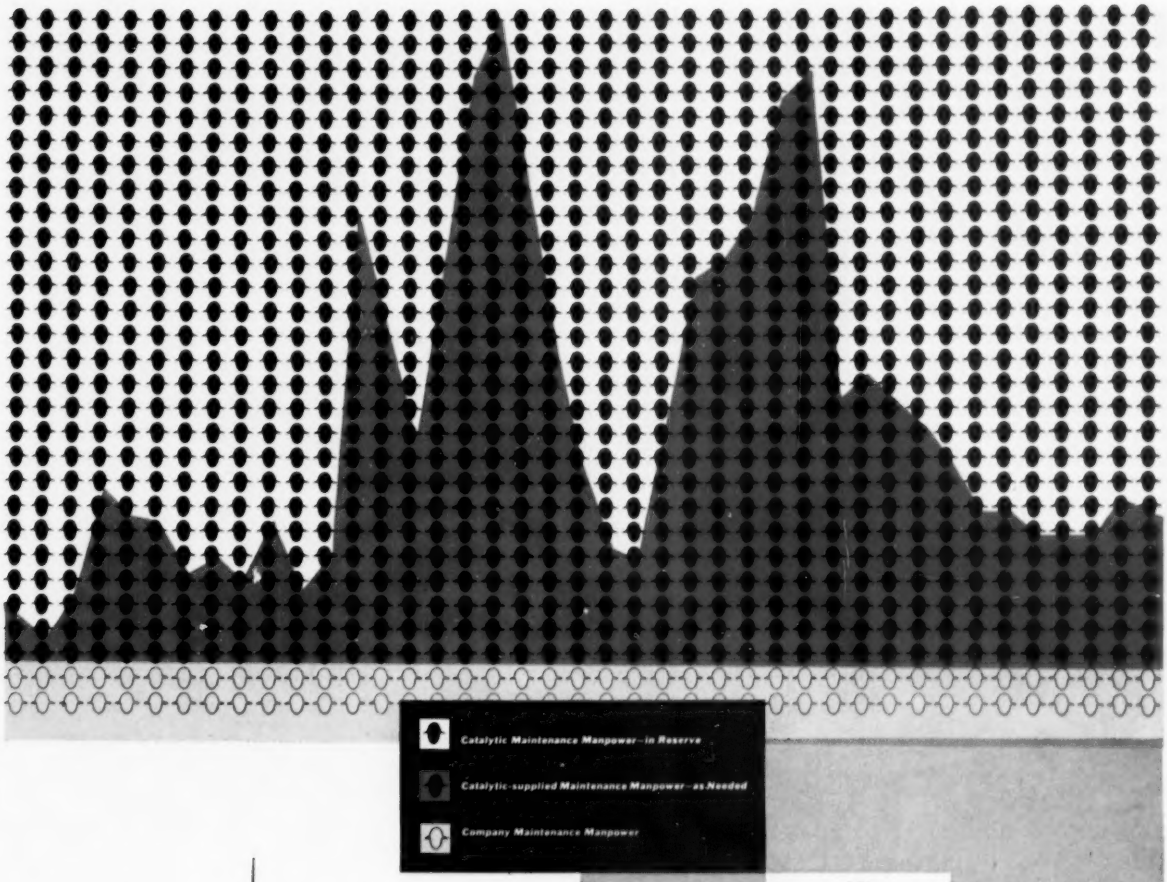
Model, Stochastic: A mathematical model in which chance is a major factor in the equations. It is often used to describe situations in which the unpredictable human element is involved; e.g., advertising.

Queuing Theory: A body of theorems governing the formation of waiting lines.

Statistics: The technique of screening a mass of data to turn it into significant and useful information.

Symbolic Logic: The body of rules and theorems governing the manipulation of mathematical symbols substituted for relating words (such as: if, no, not, or, and) in a statement. It is used to uncover true meanings and help clear up involved situations.

Waiting Line Theory: Same as Queuing theory.



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Mass.), Booz, Allen & Hamilton (Chicago), Davee, Koehnlein & Keating (Chicago), Dunlap & Associates (Stamford, Conn.).

Some of these groups will send OR teams to any part of the country. Almost all of them have had actual experience in the field, some more specialized than others. Before selecting a consultant firm, a look at past performances might prove rewarding, particularly since not all companies define Operations Research in the same way.

So far, the worst criticism of the consulting groups is that some of them have failed to make their scientific workings clear to the lay executive. An OR job is useless, of course, unless it can be reported to top management so that they understand it. To insure against this, the Midwest Research Institute writes up reports on two or three different technical levels and has frequent meetings with top brass.

Measured against results, the cost of an Operations Research study seldom, if ever, proves out of line. In fact, rather than go to the trouble and expense of setting up their own OR teams, many companies prefer using the outside groups on an intermittent basis.

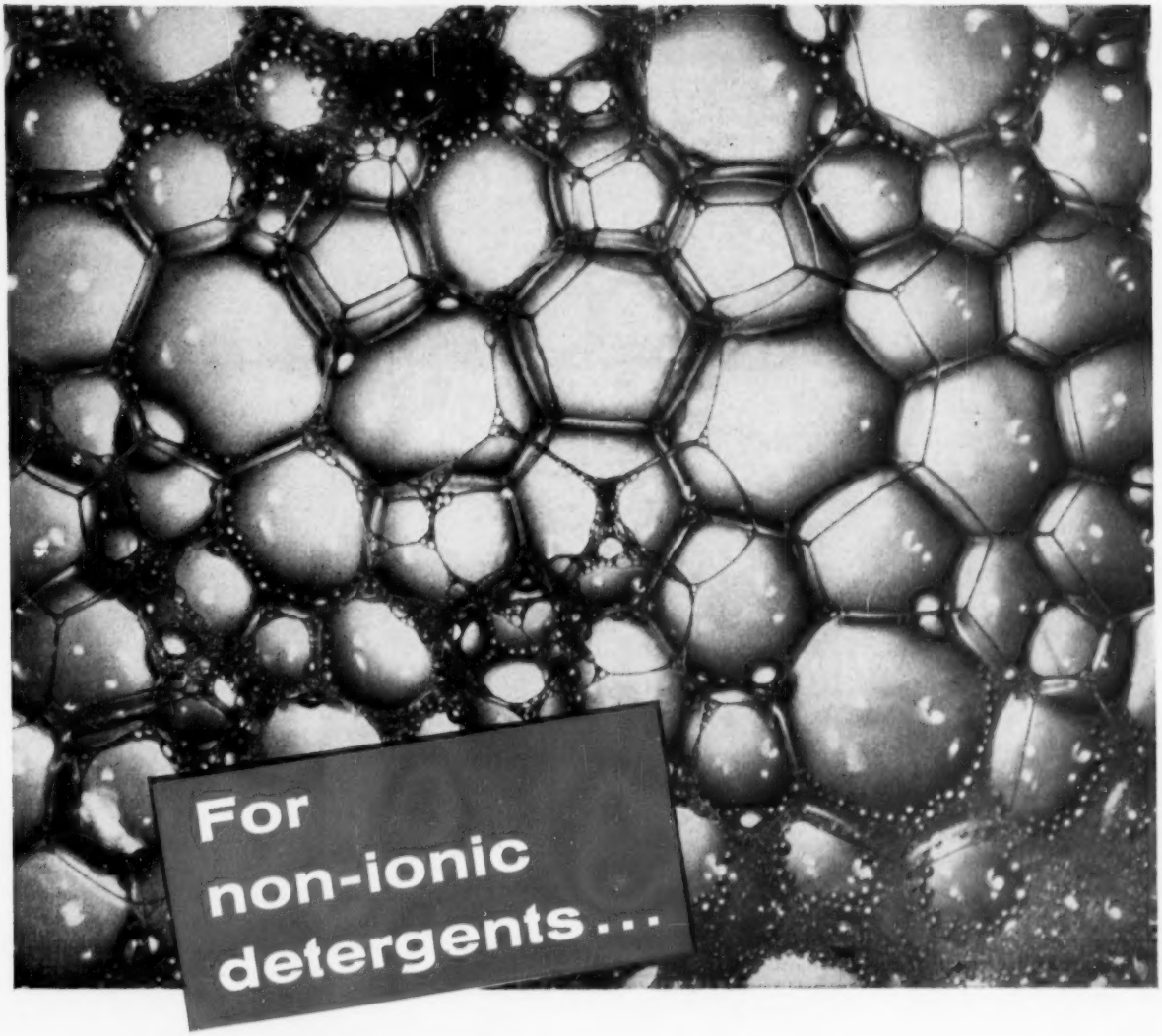
Making Contact: Assuming that the budget will stand the expense and that the company is willing to wait for results, the next step is to determine whether OR will help with a particular problem and whether it is the only answer. Some problems (dealing in nonquantitative qualities) can not be made to fit OR format; others are better worked by other techniques at less expense and with less effort.

If it is decided that Operations Research is the answer, a consulting firm is then called in, meets with top management, and roughs out an over-all campaign:

• During initial meetings, management and consultant try to define true problems, determine whether they are amenable to OR. Company records are brought out, bared, objectively dissected and discussed. At the same



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time, the consultant's OR record may be raised to show any relevancy of his earlier work to the problem at hand.

• Once the problems are defined, possible approaches are suggested. If possible, the consultant furnishes a cost estimate. If the company approves, a contact man (familiar with company operations and with enough authority to reach into and across all levels of authority) is selected, and the OR team is set up and sent into action.

• After familiarizing itself with the situation, the group tries to fill in the rough outline and firm up its campaign. Close contact is maintained with management at all times by way of progress reports.

• As the final data flows in, the OR team readies its mathematical models (*see box*: Guidebook to Operations Research) for a frontal assault on the problems themselves. Results are then passed on to management for appraisal and possible application. After this, the OR assault team often finds itself faced with new projects uncovered by its initial study. Otherwise, it is ready to fold its tent and transfer to new fronts.

Rolling Its Own: Although new consultant groups are entering the fold all the time, the total amount of work they can handle is still rather limited. The average consultant can field only about 15 major OR problems a year, and demand for his services is now rapidly outdistancing his availability. Thus it may be that the most valuable task a company can put a consultant to is the organization of a skeleton OR department against the time when the company will be able to mobilize sufficient personnel to fully staff it.

Actually, a large company may already have enough capable personnel scattered throughout its different divisions.* In this case, the task is comparatively easy; and many of the steps

* Or a company can sponsor personnel at one of the colleges now offering courses in the subject.

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of organization and operation are the same as for handling an outside OR team. But if the task is comparatively easy, it isn't automatic and requires more than merely bringing the right people together.

As with the consultant group, the company team must be given an adequate familiarization period during which it isn't pressured for payoff results. Too, management must be an active and cooperative, if silent, member of the team and help by finding and submitting possible OR problems for study.

More important, the OR group must be organized as a separate (but not isolated) staff division, free and with enough authority to work with and across all levels of organization. In turn, the OR team must be objective in its work, respect the responsibilities of other departments, keep management informed of its progress. Once these conditions are satisfied, a company OR team functions in much the same way as an outside group.

As for cost of setting up such a division, there is very little detailed information available. There are the obvious costs, of course: composite salary of the individual specialists, fee of the consultant (if there was one) who helped set up the department, and rentals on mechanical aids (such as an electronic computer).

Also of top interest to management is the fabrication of some yardstick by which results of the OR group can be measured. A tricky matter at all times, this should be handled most thoughtfully. Sometimes, results can be measured by actual savings, net profit, return on investment, or the like; but more often than not, justification for OR lies with the less tangible—improved practices, unprofitable moves not made, wrong decisions not decided, etc.

Outlook for OR: Operations Research is not a panacea for all industrial problems. It can only work with tangible, measurable factors.

Dependable Source for Chemical Raw Materials



J. H. Tomczak, purchasing agent, Flambeau Paper Co., discusses raw-material-chemical needs with Wyandotte Representative J. C. Mills.

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To date, Operations Research has proved most helpful in such areas as production scheduling, inventory control, marketing, and sales promotion. But it has also shown that it will work well in many other areas; and the beauty of it is that OR does not limit itself to any particular part of an operation. Rather it attempts to harmonize all subgroups to achieve the optimum over-all operation and obtain maximum return for the company as an integrated economic unit. And in doing this, it often helps clear away the cobwebs from corporate thinking and company objectives.

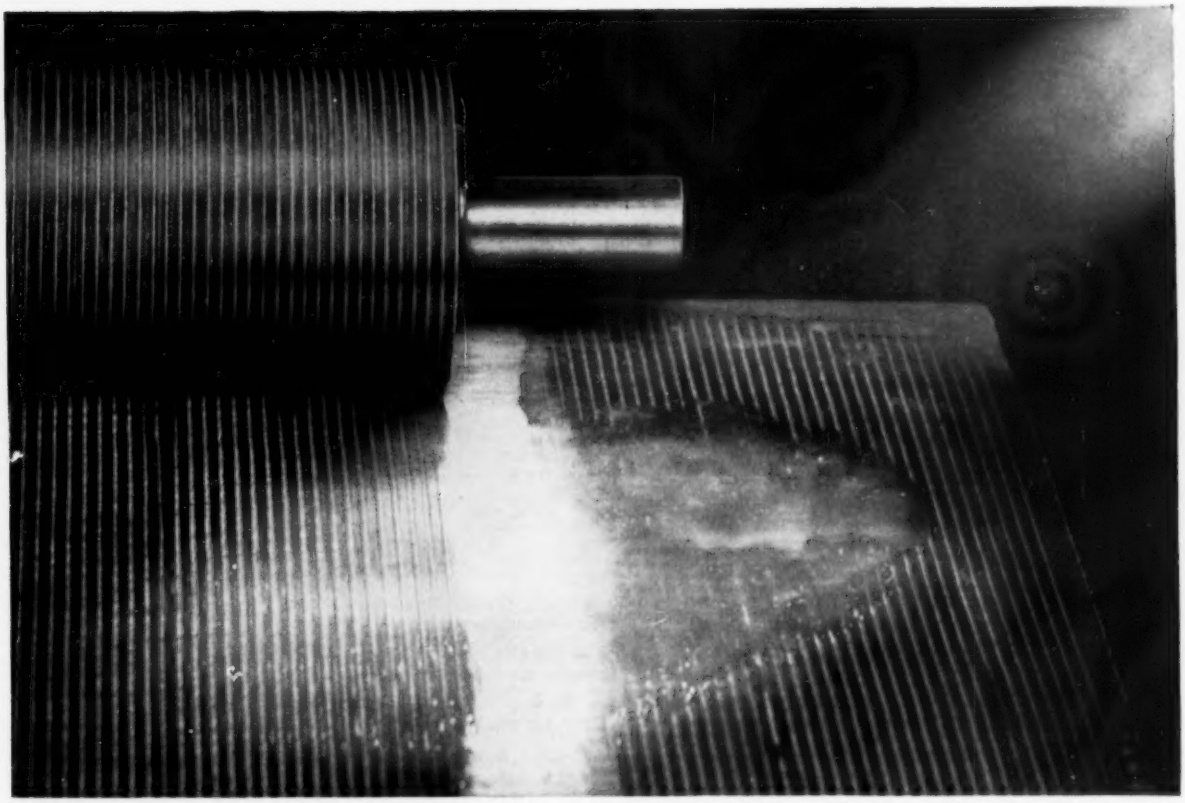
The full potential of this relatively new field has yet to be probed. But this much is certain: OR has come a long way in a short time and has a long way yet to go. Industrially, it got off to a sluggish postwar start—in the boom period immediately following World War II, when many companies were operating pretty inefficiently and not only getting away with it, but showing a profit to boot.

Then, OR took fire like a parched wheat field; and for management, the conflagration couldn't have come at a better time. Within the last few years important changes have taken place in industry: batch operations have become continuous, mechanical controls have given way to electronic circuits, paper-work has mounted, executives have had to make more decisions in less time. Only with the aid of such services as Operations Research has it been possible for these human executives to keep pace with their fast-stepping robots.

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Hair: Gray Market for Color

Hair coloring, long the black sheep of cosmetics, has become respectable, is getting big.

Fashion and home dye kits, along with gray hair and salons, have created a $40-50-million market.

"**Hair coloring** used to be part of being a 'painted woman.' But some years ago it became respectable, then it became frank, and now it's fashionable," rejoices one tintmaker.

The fashion is spreading. *Glamour* magazine surveyed its young* readers recently, found that 40% use hair coloring in one form or another. (Temporary rinses are used by 19%, lighteners by 13%, and permanent colors by 8%.)

Aside from such surveys as *Glamour's*, however, precise market figures aren't known, as is often the case in cosmetics. But estimates (probably conservative) put the value of hair coloring preparations annually sold in the U.S. at $40-50 million.

Most of them are sold to women trying to hold the line against tattletale gray hair, but they aren't the only buyers. It's fashionable to have the "right" shade of hair, which is usually a brighter, better-defined color (rather than "sort of brownish" or "dishwater blonde").

A Woman's Privilege: The "right" shade is obtained with one of three types of color: bleaches, permanent and temporary tints. Color rinses, adding shades that last only until the next shampoo, are the most popular. Their erasability appeals to uncertain first-time users and others who enjoy the woman's traditional prerogative of changing her mind. The temporary rinses use vegetable colors together with tartaric acid.

Of the hair color "Big Three," two (Roux Distributing Co., Inc., and Nestle-LeMur Co., both in New York) have a temporary rinse, and one (Clairol, Inc., New York) doesn't. The temporary rinse is the only kind of coloring sold by Noreen, Inc. (Denver) and Helena Rubinstein, Inc. (New York). Prices range from 50¢ for 14 capsules (Nestle) to $1 for 8 (Rubinstein)—one rinse per capsule.

* Median age of readers: 27.7. Seventy-four percent are younger than 35.

For those who prefer blondes, an improvement has been made in the old stand-by, hydrogen peroxide. Controlled-action bleaches, which stop their lightening action on a shade-to-shade basis, help to make actual blondes if hair tends that way. Gentle bleaches, made by Richard Hudnut and Bymart-Tintair, Inc. (both in New York), Roux, Clairol and Rubinstein, retail for about $1.50 for 6 oz.

Other dyes are permanent, lasting until new hair grows out. These are for people who know what they want, particularly those who know they don't want gray hair. Roux, Nestle and Clairol sell these for home and professional use; Hudnut and Tintair, for home use only. Home-use dyes cost $1.50-$2.50 for one treatment. The professional operators, who charge $3.50-$5 for an application, pay about 60¢ for the dye.

At Home: A few years ago three hair coloring trends began to shape up: dyeing began to be fashionable, became easier, and started to be used at home. The whole industry benefited. The Beauty and Barber Supply Institute figured in 1953 that 12% of all salon business, or $90 million worth a year, was hair coloring. Assuming that one-sixth of this was the price of the dyes themselves, the professional market alone came to $15 million/year.

Two developments made home use easier. The range of shades was reduced to 12 or 14 in each line, and prebleaching was made unnecessary by a formula that bleaches as it dyes.

Tintair set the pace for home-use dyes with an advertising campaign in which celebrity testimonials lent glamour appeal to hair coloring. Others quickly followed, and the home market is now estimated to be worth $25-30 million.

Peroxide Brunets, Too: The new home-use dyes are essentially the same as the professional material; the difference is mainly in packaging. The



HOME DYES: Carless users get: wrong color, angry, a different brand.

kit comes in two parts. One bottle contains, essentially, a "para" (aniline) dye, and ammonia.

The other bottle contains hydrogen peroxide—not to bleach, but to mix with the dye and oxidize it. (Most makers, fearful that the peroxide will become stale before use, sell only the dye, recommend that users buy fresh peroxide directly before use.) The tint loses its power about 30 minutes after being mixed.

Is It Dangerous? "Para" dyes have long had a reputation for being dangerous. They are banned in Germany, France and Austria; and the U.S. hair dyes containing para must be labeled with instructions for making a patch test for hypersensitivity and a warning against using near the eyes ("to do so may cause blindness"). A group of dermatologists testifying before a Congressional committee unanimously thought the dyes dangerous; one called para "the most dangerous of all cosmetics"; only one considered the patch test a valid indication of hypersensitivity.

Claims one pro-para doctor: the greater purity of para now used, the greater care in making the oxidizing solution, and the lower ammonia content (should be below 1½%) have reduced the number of cases of hypersensitivity from 1:10,000 in the 30's to

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3215 MATHIESON

1:80,000 now (the latter figure is based, however, only on letters of complaint received by one company).

Locks of Hair: This hazard doesn't seem to bother the companies as much as the problem of color. After its initial grand entrance on the scene, Tintair floundered for a while because people weren't getting the results they hoped for. As with any do-it-yourself, not everyone could do it well. Some ended up with an unwanted color because they didn't follow instructions; some, because the sales clerk didn't recommend the right shade.

Getting information to sales people, salon operators and users (with books, booklets, charts, traveling advisors) has become a major activity of the color firms. Many will recommend dyes on the basis of a strand of hair mailed in with a description of the desired tint.

Competitors Wanted: Still pioneering, the industry believes that most of its customers are won from the ranks of nonusers rather than from rivals. "Hair color brands have more customer loyalty than does any other cosmetic," says one hair color executive. His reasoning: a fearful reluctance to experiment keeps users in line. Another company reports that sales are still very good on a line superseded in 1952 by a superior product.

That's why many of the companies still welcome competitors, particularly those with big advertising budgets. They cite the way Tintair's burst of promotion helped sales of all hair coloring products. The market isn't near saturation yet, they're sure, and more campaigns will bring new converts.

•

Alluvial Aluminum: A new aluminum coating is made of minute aluminum shot suspended in a vinyl plastic. Paintlike, the coating can be applied by either brush or spray to wood, metal, concrete or fabric. Applied to metal, this liquid aluminum, laid on in a thickness of about 1/64 in., has the ability to prevent surrounding rust from creeping under the surface of the coating. A gallon of the product, which will cover 250 sq. ft., costs about twice as much as regular paint, but is said to have a life expectancy three times as long. It will withstand a temperature range from 40° below zero to 600° above. It was developed by Woodhill Chemical Co. (Cleveland).

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Vulcan-designed ethanol plant utilizing waste sulfite pulp liquor

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- **DISPOSAL OF PROCESSED RESIDUES**

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Waste utilization facilities require the same comprehensive engineering as the primary plant—including special consideration of the processes from which the wastes result. Vulcan Engineering Division offers complete facilities and engineering service for the job required . . .

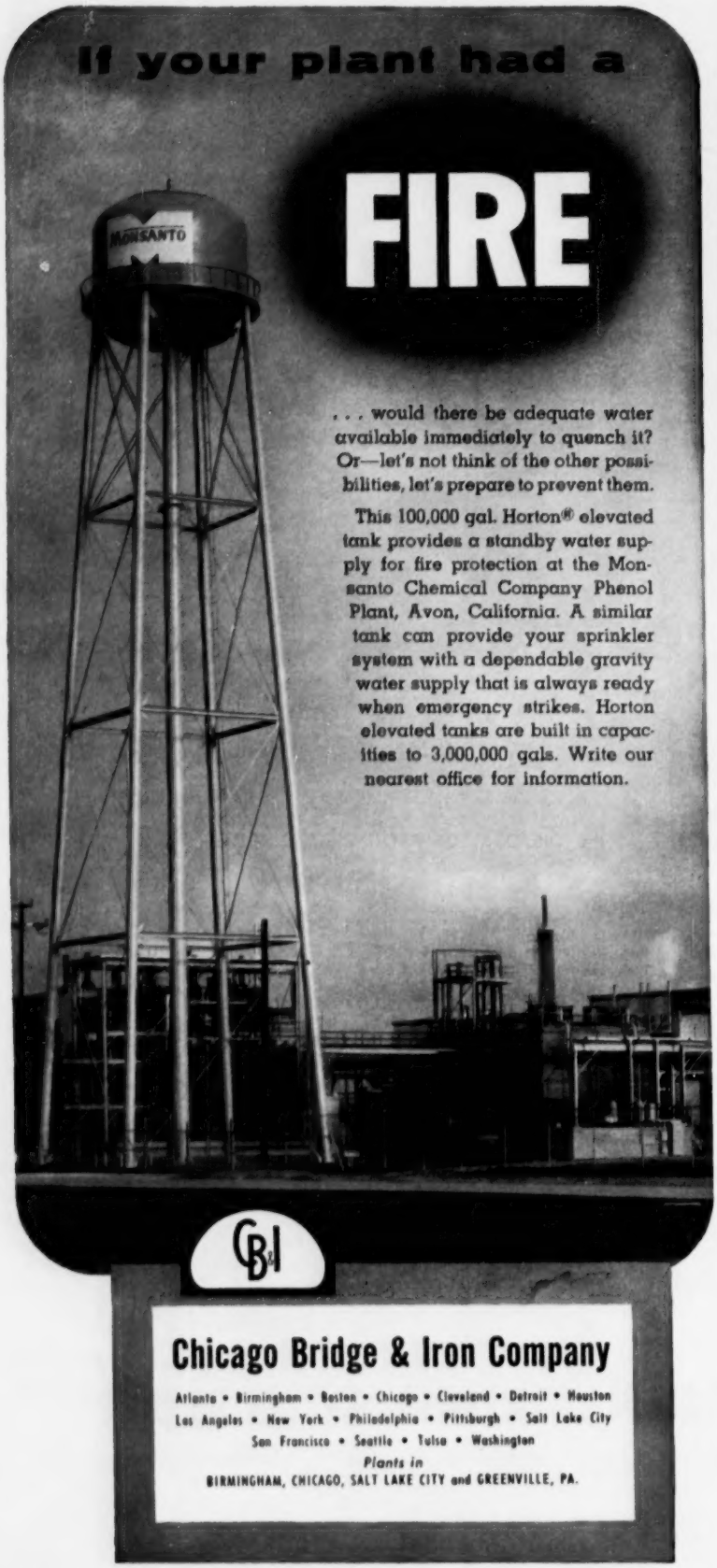
- Preliminary economic evaluations of applicable processes
- Process development by laboratory and pilot plant, integrated into a detailed process design
- Specification and procurement of equipment and matesials
- Erection of the waste utilization facilities
- Initial operation and operator training

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WASH-UP TIME: The housewife has three more to choose from.

Add Three

Fast swelling are the ranks of makers of liquid synthetic dish-washing detergents. The newcomer, (May 2), Colgate-Palmolive became the third of soap's "Big Three" to market a liquid syndet: in Midwestern sales districts, it unveiled Vel liquid.

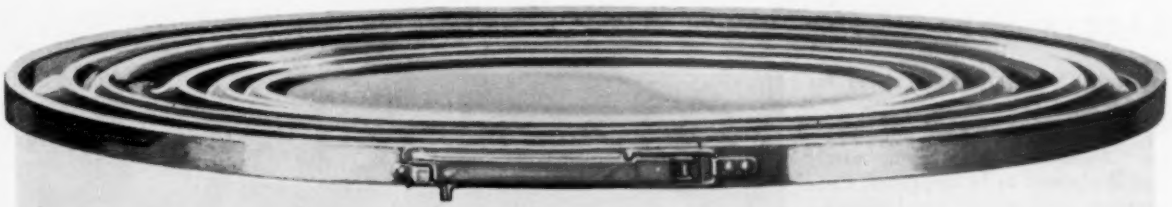
Major novelty of Vel liquid is that it's tinted—Colgate picked pink as the color for its entry.

Colgate has also chosen to can-pack its product (*CW, Jan. 8, p.44*). It's using American Can Co.'s 12- and 22-oz. containers, and suggests a retail price of 39¢ and 69¢ each.

But Vel isn't the only recent entry in the lists of fluid sudsers. Liquid Chiffon, made by Armour, is also on the shelves in many areas across the nation. Another "metalized" product, it hasn't yet been heavily promoted, although the big push is due to start within weeks.

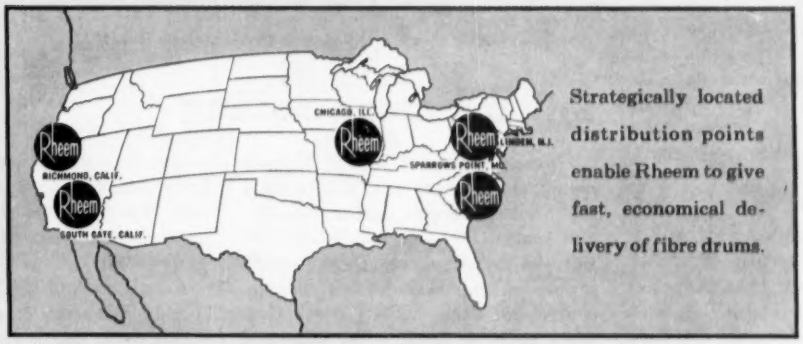
And Purex, too, is testing Trend, a liquid packed in a metal container —Canco's unit once more. Trend is not now in national distribution.

Container Competitors: Adding to the flurry caused by these new products is Continental Can Co.'s demonstration of its latest unit for syndets (and similar liquids). Continental, already producing a can for Babbitt's



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ABOUT ⅓ THE WEIGHT OF STEEL—AND LESS THAN ½ THE COST!

Glim, has a new package slated for August production.

Tagged the Fluid Flow can, it features a threaded polyethylene nozzle that is claimed to be dripproof. Construction requires little metal exposure—unit is cemented, and can be wrap-around lithographed.

An enamel coating on the interior, and a special varnish to protect the lithography from possible damage during filling, are also provided.

Just who gets first chance at the new container, Continental isn't saying. But there is industry talk that one of the "Big Three" is trying out a liquid form of a well-known bar product to compete with its already-established liquid syndet.

The new products and packages show there's a heightened tempo in the battle for leadership among liquid synthetic detergents.

•

Double Shot: Monsanto's Ross Hedrick and Quirino Trementozzi have worked out a combination soil conditioner-fertilizer (U.S. Pat. 2,703,-276). It is made up of a water-soluble polyelectrolyte and plant nutrients, in water solution.

•

Fruit Coat: For cleaning fruit, and at the same time protecting it against mould, Lee Worson (Los Angeles) has compounded a stable emulsion that includes 25.2% paraffin oil, 6.6% fatty acid, 40% xylene, 5% nonionic emulsifier and detergent, 10.1% anionic emulsifier, and 1% of an organosilicon oxide polymer. A detergent and mould inhibitor are added to this in water to provide a fruit-treating solution (U.S. Pat. 2,703,288).

•

Aid to Plastics: Citroflex A-4 (acetyl tributyl citrate), Pfizer's new citric acid ester plasticizer, is now commercially available. The Food & Drug Administration has accepted its use in films for food and beverage containers. Inexpensive and odor-free, Citroflex A-4 is a high-boiling liquid of low toxicity soluble in most organic solvents. The company recommends it for use in heat- and light-stable polyvinyl chloride films and sheetings, cellulose-based lacquers and in formulations with polyvinyl acetate, polyvinyl acetals and polyvinylidene chloride. Another new citrate plasticizer: Citroflex A-8 (acetyl tri-2-ethylhexyl citrate).



ANTISOILED CARPET: Vacuum whisks up soil, leaves the colloidal coating, which smooths away microscopic dirt catchers.

Silica Versus Soiling

Antisoiling treatment of rugs and carpeting, making use of colloidal silica, has been a common practice for several years (CW, Oct. 31, '53, p. 48). But the full implications—and applications—of the treatment were demonstrated last week by Du Pont's Graselli Chemicals Dept. when it showed how application of its Ludox colloidal silica is an effective soil retardant for everything from carpets to wall paper and paint.

Though Du Pont put on the show to promote its Ludox, this soil-slowing process is largely based on the patented work (U.S. Pat. 2,632,307) done by Mohawk Carpet Mills, Inc. Already, Mohawk and some of its licensees are mill-treating rugs to retard soiling. And a pair of firms, Artloom Carpet Co. (Philadelphia), with Dellay, and Chemical Service Co. (Baltimore), with Retard, are offering home-applicable Ludox formulations.

No Secrets: Ever since the soil-retardant process was introduced, rug makers have been exceedingly reluctant to give out details. Undoubtedly, patent and license negotiations have contributed to this reluctance.

Now, Du Pont appears to have worked out the licensing arrangements to everyone's satisfaction. It will collect royalties as it sells the Ludox for antisoil products—both Mohawk, and Monsanto (which has patents applying to silica upholstery treatment) are directly dealt with only by Du Pont.

Also, for about the first time comes a detailed description of how the antisoilers work: seemingly, the fine silica (in Ludox, particles are spheres about 17 millimicrons in diameter) coats the fibers of carpeting material, giving a smooth surface that can't easily be vacuumed off, but to which soil won't cling. The fiber coating also fills in the microscopic flaws in the fiber surface (soil receptors)—and because of its extreme fineness, does this without altering the color.

Little Size, Little Volume: It is quite simple to apply an effective silica coat—a 3% water solution of Ludox can be lightly sprayed on the carpet or upholstery—just dampening it. It's allowed to dry, and the job is done.

Formulations of the silica are likewise simple to manufacture. Du Pont sells Ludox with 30% solids (it does not sell a consumer antisoiler, itself). The formulator just dilutes it, and adds a softener (to improve the hand of the fabric). Rug shampoo formulas have also been worked out.

Because the silica fills in and smooths out the potential soil recep-

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"Eheu, fugaces labuntur anni!"

Today, at Dicalite, we would translate that, very broadly indeed, "Good Heavens! Twenty-five years gone by so soon!" For, as we look back to 1930 and our beginnings, we feel a double sense of wonder... first, that a quarter-century has sped so fast, and then, that we (and diatomite) have come so far in so short a time.

As you know, Dicalite is both our Division name and the family name of a whole host of materials processed from diatomite. This unique material, once regarded as almost an oddity, used occasionally as 'chalk-rock' building stone or in fire-lighters, today serves important uses in more than 200 industries.

This great expansion is due, in no small part, to the warm cooperation of the industries which we serve. Their laboratories have worked with ours, their product engineers and ours have together pioneered new developments, new uses, for this versatile earth.

Hence, we would like to make this, our 25th milestone, an expression of thanks to the many industries throughout the world whose ready acceptance and continued use of Dicalite have made possible our growth. Their support has enabled us to advance from 1930's one deposit, one plant, to our present four deposits and four processing plants. Our obligation is cheerfully assumed and Dicalite will contribute even more greatly to industry's progress during our next quarter-century.

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P.S. *The cryptic headline is from the Roman poet Horace (Odes II, xiv. 1). Its literal translation is "Alas, the fleeting years glide by," but we cannot echo the poet's expression of regret.*

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tors in many surfaces, Du Pont has found that it successfully slows the soiling of such things as latex paint surfaces, plastic fabrics, window shades, wall paper. So far, no products on the market stress these applications, but there's every reason to believe they'll be offered soon.

•

For the Plant: Among the new specialties with industrial application:

• Compound 16-093 is a chemically resistant plastisol developed by Watson-Standard Co. (Pittsburgh, Pa.). Designed for coating metal parts, it can be dip-applied, or modified for spray- or roller-coating. It is heat-cured, available in several colors.

• Lunn-Lease, a film-forming mold-release agent developed by Lunn Laminates, Inc. (Mineola, N.Y.), is now available to reinforced-plastics makers. Spray-applied, the new releaser is sold for $4.85 gal. (in 5-gal. cans) by Arrow Sales & Service (Mineola, N.Y.)

• J. M. Huber Corp. (New York) is offering a low-cost general-purpose oil furnace black called Arogen GPF. It is suggested for use in rubber tires and mechanical goods.

• Ammate weed- and brush-killer is now available in a more concentrated formulation called Ammate X. Made by Du Pont, the herbicide contains 95% active ingredient (against 80% in previously offered formulations), is available in bags, drums, and 2- and 6-lb. packages.

• Du Pont is also selling its urea herbicide, Telvar W, for tree and brush control (product is recommended for this only in Oklahoma, Texas, Kansas, Missouri, Arkansas and Louisiana).

• Laqua is a new coating for metals, developed by Fidelity Chemical Products Corp. (Newark, N.J.). Claimed to prevent corrosion and discoloration, Laqua can be over-coated with conventional organic paints.

•

Stop the Presses: Down time for cleaning printing presses is said to be cut two-thirds by a new one-solution press wash, Squeeky-Kleen. The one-step cleaner is sold for half the price of conventional cleaners. Squeeky-Kleen is claimed to restore finish to rubber blankets and rollers (it isn't recommended for gelatin rollers) without the need of pumice or periodic lye baths.

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TREND-BUCKER: Sans movable partitions and bucolic delights, it argues . . .

Case for Independence

In Buffalo, N. Y., this week, National Aniline Division (Allied Chemical) is opening a new research center that violates two injunctions of modern laboratory design: the building is not in the country and it doesn't rely on movable partitions to divide lab space within its four brick-and-glass walls. In other respects, too, the structure is a maverick.

But it is well suited to National Aniline's requirements—and therein it is worth the attention of a host of companies that are (or soon will be) facing up to problems of planning a new research laboratory. The lesson taught by National Aniline's experience, briefly, is this: make certain that you have correctly gauged the function of the proposed facility, then discard any design idea (popular though it may be) that doesn't measure up.

National's research function, according to Wesley Minnis, the division's research director, is primarily organic synthesis. It's the thread, he points out, that runs through all of the division's research, whether it be on phthalic anhydride, maleic acid, vat dyes, diisocyanates, surface-active agents or any one of a number of other products.

"We have been in this kind of work for a long time," Minnis states, "and we intend to stay in it. So we know our needs." And, in his opinion, they do not include a high degree of flexibility. That's why the predominant working unit in the new building is the six-man permanent laboratory, although two-man labs are also provided.

Movable partitions, Minnis avers, would not serve any useful purpose. To expand a project, he says, "we will simply add researchers, give the leader authority over another lab in his area if more space is needed." Shifting groups from one laboratory to another is said to pose no special problem. Reason: all laboratories contain essentially the same equipment (i.e., for synthesis work).

To make this possible, special equipment, service facilities and storage space were taken out of the laboratories and installed in central quarters:

- Apparatus such as autoclaves, high-speed agitators and laboratory spray driers are set up in special rooms (on the building's lower level) and provided with a staff that operates the machines when they are needed.
- Washing of glassware is carried on in a central washroom to reduce hoarding, remove heavy inventories of dirty apparatus from individual laboratories. To get his glassware washed, a chemist puts it into a plastic receptacle that is sent to the washroom.
- Samples of chemicals are stored in rooms set aside for this purpose. Cost of such storage space, admits Minnis, is high. But, aside from other considerations, this move is justified by the improvement in working conditions resulting from the removal of ceiling-high shelves of dusty sample bottles from laboratories.

The laboratories themselves are modern and functional but not characterized by unusual new features. Exception: the azo-dye groups have bench tops of lead instead of the more common albarene stone. Edged with a retaining lip, the metal top simplifies the use of ice and cooling water (required routinely by heat-sensitive diazotizations); no pots are needed.

Desirable but Dispensable: Location of the new research center was dictated primarily by the nature of the division's research system. The country with its pleasing surroundings and lack of distractions is desirable, Minnis agrees, but only when the advantages of such a move are clear cut and not overbalanced by other considerations.

He believes that the suburban atmosphere may have a marked salutary



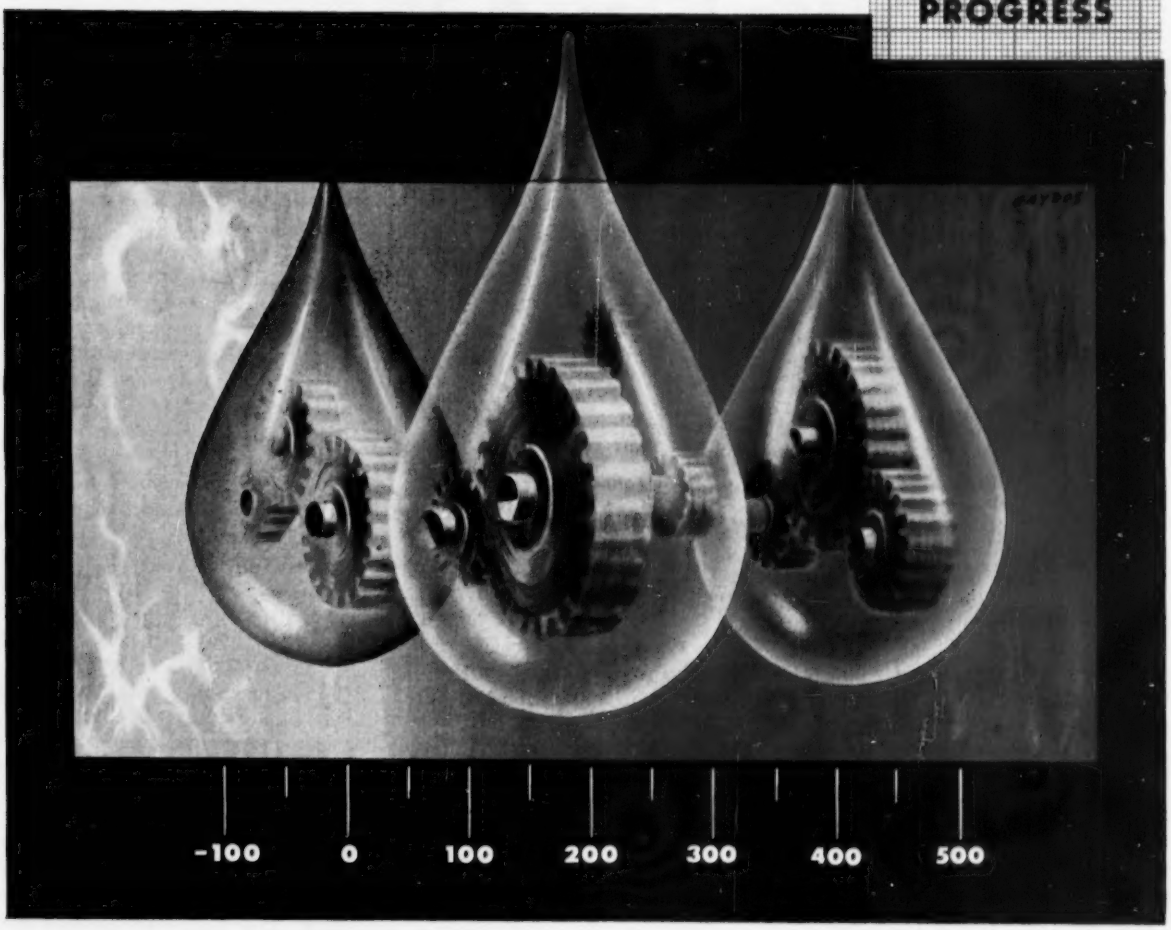
NATIONAL'S MINNIS: Synthesis is his design yardstick.

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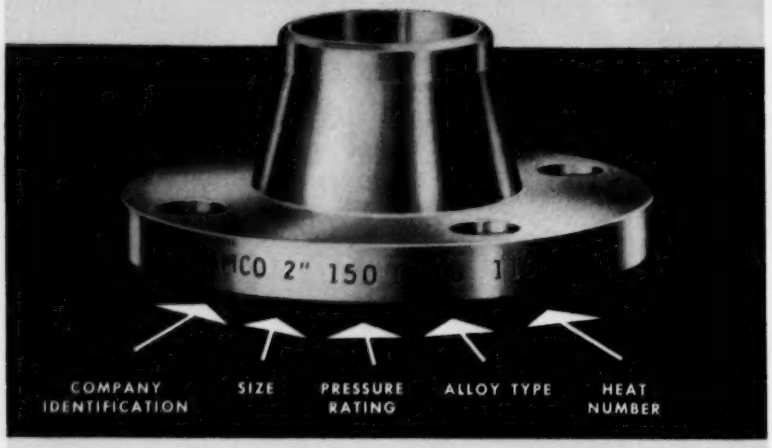
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influence on the productivity of researchers whose work is largely exploratory and fundamental. But that assignment is the responsibility of Allied Chemical's central research laboratory in Morristown, N.J. National's researchers are concerned with product and process studies in (to them) familiar fields. Without understating the difficulty or importance of the task, Minnis feels that it does not demand the country for successful performance.

On the other hand, he maintains, there are compelling reasons for the location decided upon—e.g., adjacent to the division's Buffalo, N.Y., plant. "Because of the way we work," Minnis explains, "it's important for our researchers to be close to the plant."

Accustomed to wearing several different hats, National's chemists are responsible for seeing their discoveries safely into production. They work out the synthesis in the research lab, assume the role of development chemist by installing the procedure in the semiplant,* demonstrate the process to operating personnel, write a manual and turn over cost estimates. But that doesn't end it; if the process doesn't run as stated, the chemist is called into the production plant to serve as trouble shooter.

To operate efficiently the system calls for close contact between research and production men. Moving the lab away from the plant is not calculated to promote closer contact.

Being next door to the plant, however, carries penalties. Among the worst of these, for Minnis and his researchers, is the inevitable dust and grime of a plant that manufactures dyes and heavy chemicals. Their old laboratory building, built in 1917, accumulated more than its share of grime during its long service.

So it's not surprising that all concerned were strongly for a structure they could keep clean. Accordingly, laboratory walls are tiled, will be washed down several times a year as needed. And air for ventilation is filtered as it is brought into the building.

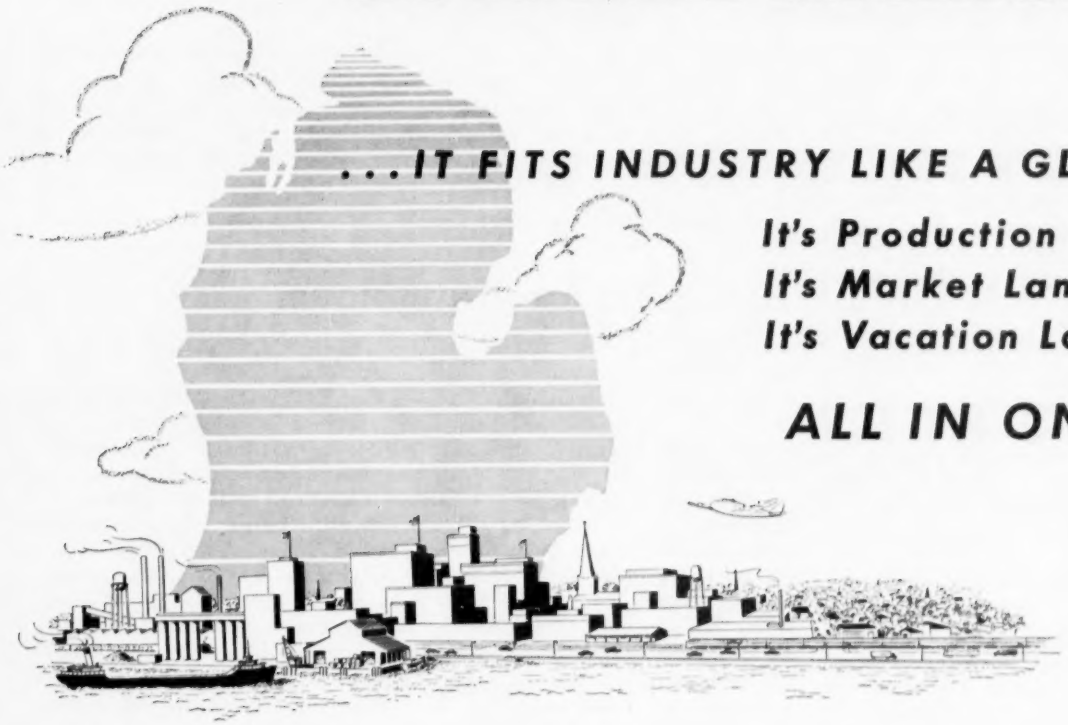
On another point—room for growth—the research center again veers from general practice. Not much provision

*In National Aniline's terminology the semiplant is the step beyond the laboratory. Several semiplants, scattered over the division's Buffalo plant area, will be consolidated in the research center. The pilot plant, which comes after the semiplant, is the first commercial production unit.

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for expansion has been designed into the structure—and that's not merely a bow to economy. It's based largely, explains Minnis, on the realization that National's activities are changing.

Only three years ago, all the division's production activities were situated at Buffalo. Today, however, National operates a plant (aniline) at Moundsville, W. Va., is completing plants at Hopewell (caprolactam) and Chesterfield (nylon-type fiber), Va.

And, in addition to spreading out, geographically, it is entering such new areas as synthetic fibers and di-isocyanates. This presages application studies in textiles, adhesives, foamed rubber and other fields served by these new products. A far cry from straight organic chemistry, development work of this kind requires relatively more floor area (for special testing apparatus, etc.) than do the division's traditional activities.

The division decided that it would not attempt to anticipate these new needs and provide for them in the research center. Rather, it probably will build relatively simple adjacent structures when its requirements are more definite.

This, and many of National Aniline's other ideas on research construction, are wide open to debate. But the individual ideas are not nearly as important as the message they collectively convey. Simply, it's that a little independent thinking on design can pay big dividends in the functioning of a new laboratory, although in National's case it did not result in lower than normal (e.g., about $35/sq. ft.) construction costs.

In any case, the division has backed its conviction with an investment of better than $2.25 million in the new facilities; it expects that time will confirm its wisdom.

•

Joint Effort: Wah Chang Corp. (New York) has revealed a cooperative agreement with the Bureau of Mines to conduct research on high-quality titanium sponge at the government's Boulder City (Nevada) experimental station. According to the firm's executive vice-president, Thomas Moran, the project is expected to begin in June, will cost Wah Chang approximately $600,000/year. Tungsten producer, Wah Chang has been researching titanium since 1950 at its Glen Cove, L. I., division.

FOUR STEPS TO THE STARTING LINE

The Assortment of aromatic acids fractionated by Dow researchers is produced by this general procedure.

1 Pulverized bituminous coal, suspended in aqueous sodium hydroxide is. . .

2 Subjected to gaseous oxygen at 270 C and 900 psig.; about half the carbon goes off as CO_2.

3 The resulting acid solution is treated with sulfuric acid, extracted with methyl ethyl ketone and vacuum dried.

4 Product is the acid mix, a yellow solid containing at least nine components. These have been identified: phthalic, isophthalic, terephthalic, benzoic, benzenetricarboxylic, benzenetetracarboxylic, methylphthalic, naphthoic and toluic.

Better Bet for Bituminous

Like a lodestone draws iron, bituminous coal continues to attract chemical researchers. Partly responsible for their sustained interest are coal-derived mixed organic acids that might ultimately be produced (by alkaline oxidation*) on a large scale for as little as 5-6¢/lb.

Thus far the difficulty of finding applications for the mixed product, coupled with the problem of separating its ingredients, has confined developmental work to the laboratory. But this week research at Dow's polychemicals laboratory (Midland, Mich.) is raising hopes that these twin hurdles can be overcome.

Dow chemists have come up with two fractionation methods—one based on solvents, the other tied to pH change—that show promise. In addition they have quantitatively determined the major components of the mixture, thereby providing a boost to utilization studies.

Material for these studies was a mixture of water-soluble organic acids made (at Carnegie Tech's coal research laboratory) by oxidation of a caustic suspension of pulverized coal. Composition of the potpourri was found by Dow's Robert Montgomery, Early Holly and R. S. Gohlke to include 21% of trimellitic acid (1,2,4-benzenetricarboxylic), 11% of phthalic acid, 3.1% of isophthalic, 1.7% of terephthalic, 1.2% of benzoic, and less than 1% each of naphthoic, toluic, methylphthalic and benzenetetracarboxylic acids. Remaining components were not identified.

Two Routes: The first of the new fractionation procedures, worked out by Montgomery and P. J. Sienknecht, involves the extraction of an aqueous solution of coal acids with mixtures of methylethyl ketone and carbon tetrachloride (and petroleum ether). Varying the concentration of the ketone changes the composition of the fraction obtained; higher-molecular-weight cuts require a high proportion of the former.

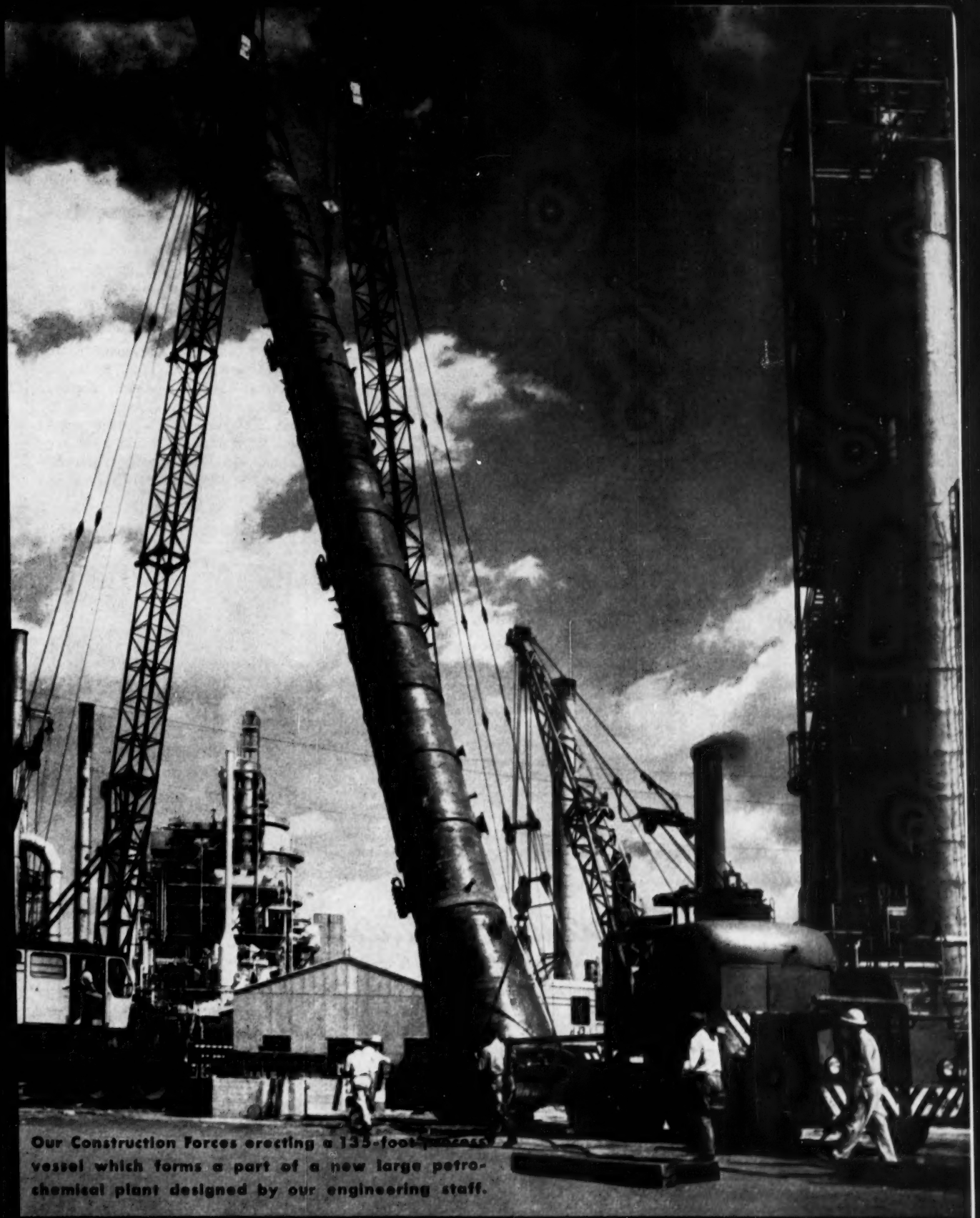
Difference in acid strength of the various components is the key to the second technique. By this method, an aqueous solution of the acid mixture is first made alkaline, then acidified in stages and extracted with methylethyl ketone between additions of acid. Largest fractions come out at a pH of about 3.

Neither method isolates individual acids. And even if further refining techniques (e.g., vacuum sublimation) can be successfully applied, it's doubtful that individual acids could be recovered, economically. Dow, however, is not overlooking this possibility.

Food for Thought: Potential applications for mixtures of aromatic polycarboxylic acids in the resin field are not very difficult to visualize. Polyesters and alkyds, of course, are providing most food for thought.

Gulf Research & Development (Pittsburgh, Pa.), moreover, has two patents describing the coal acid mixture's use in synthetic lubricants (2,-

* A process described in U.S. Pat. 2,555,410, assigned to Carnegie Institute of Technology.



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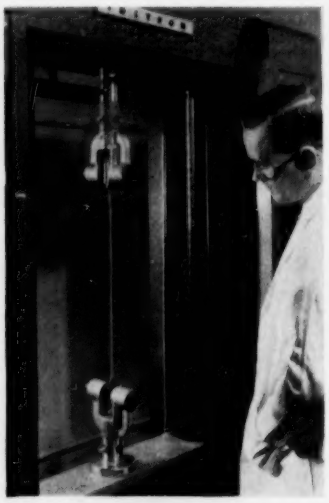
568,965) and hydraulic fluids (2,516,640).

Other suggested uses: acid metal-cleaning solution; replacement for maleic acid in breaking petroleum emulsions; dispersing agent in drilling muds; substitutes for other organic acids.

At this stage most of this is conjecture. But the Dow findings could catalyze the research needed to convert some of this fancy into fact.

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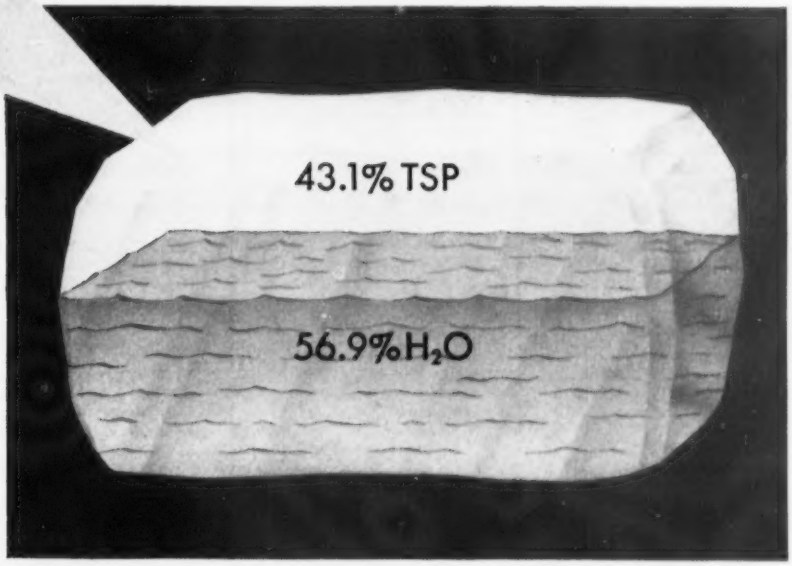
Hopeful Alkaloid: Rescinnamine, an alkaloid newly isolated from *Rauwolfia serpentia* extracts, reportedly displays hypotensive activity at least equal to that of *Rauwolfia*-component reserpine. The find was made by Riker Laboratories (Los Angeles) researchers M. W. Klohs, M. D. Draper and F. Keller.



For the Long Pull

HIGH ELONGATION goes hand in hand with high molecular weight in Kopper's new polyethylene. Latest entry on the fast-moving polyethylene scene, the product, stretched here by Koppers test-lab chief George Pick, reportedly elongates about 575% before breaking. Par for other commercial polyethylenes: about 200%. High-tenacity polyethylenes are now reported to be under development by several other makers of the plastic.

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On the Skids: Chemical Imports

Commodity	Unit	Quantity 1954	Quantity 1953	Percent of 1953	Dollar Value 1954	Dollar Value 1953
Acetic acid—over 65% by weight	lb.	1,537,663	4,118,740	37.3	103,700	252,857
Arsenic trioxides	clb.	9,695,722	9,934,212	97.6	544,900	574,069
Naphthenic acids	gal.	994,105	1,229,291	80.7	729,700	900,754
Ethyl alcohol	gal.	1,192,883	8,874,148	13.4	186,100	1,413,751
Coal tar distill and mixt.—N.S.P.F.	lb.	14,569,637	18,411,834	79.0	450,900	749,102
Colors, dyes and stains—coal tar, N.E.S.	lb.	2,676,598	2,580,018	103.5	7,227,737	6,202,358
Menthol, natural	lb.	281,934	252,743	111.3	1,373,300	1,388,627
Iodine, crude	lb.	945,989	957,638	98.9	1,034,000	1,606,024
Magnesium sulfate	lb.	66,146	13,563,455	0.49	13,000	167,478
Potassium perchlorate	lb.	110,072	125,662	88.2	14,900	16,522
Argols—under 90% potassium bitartrate	lb.	12,278,796	10,661,986	114.9	620,500	462,613
Dead or creosote oil	gal.	39,536,092	54,025,226	73.1	7,521,300	9,920,243
Cresylic acid	gal.	1,326,343	1,298,599	102.2	558,700	1,178,831
Calcium cyanamid	s.t.	84,211	82,218	102.5	4,520,900	4,499,373
Calcium nitrate	s.t.	68,637	67,794	101.2	2,551,900	2,574,658
Sodium nitrate	s.t.	731,530	568,873	128.8	26,817,800	23,268,113
Ammonium phosphates for fertilizer	s.t.	164,133	166,497	98.6	11,835,800	11,419,915
Fish scrap and fish meal	s.t.	27,809	18,960	146.6	3,160,900	2,172,912
Vinyl acetate, unpolym.	lb.	28,926,303	27,008,309	107.0	4,904,300	4,939,135
Potassium—Sodium nitrate mixtures, crude	s.t.	8,819	12,516	70.3	399,500	626,149
Peat moss—fertilizer grade	s.t.	220,768	180,996	121.9	7,910,900	6,488,920
Carbon tetrachloride	lb.	70,848	1,467,085	4.8	13,107	128,396
Dextrine—from potato starch or flour	lb.	10,954,813	8,034,640	136.2	891,500	663,001
Iron oxide and hydroxide—synthetic	lb.	9,993,529	9,062,132	109.3	602,800	522,618
Barytes ore, crude	l.t.	283,119	298,918	94.6	2,274,800	2,514,828
Whiting—dry, ground or bolted	lb.	20,178,535	21,454,714	93.8	154,000	173,720
Acetylene black	lb.	7,715,875	9,007,016	85.8	1,281,500	1,435,062
Antimony oxide	lb.	2,952,748	2,592,338	113.8	645,000	579,600
Benzene	gal.	12,496,533	20,593,808	60.6	3,968,200	7,407,702
Sodium silicofluoride	lb.	4,606,231	5,725,839	80.4	182,008	200,044
Potassium chloride	s.t.	147,344	173,154	85.2	3,746,600	4,504,876
Sodium cyanide	lb.	108,727,543	128,825,245	84.3	5,793,600	6,564,660
Sodium sulfate, crude	l.t.	103,931	47,739	217.0	2,062,172	875,599

Country-by-country, the more significant changes appear like this:

NAPHTHALENE: For the third consecutive year, naphthalene imports again diminished, this time 80.3% of 1953. Belgium resisted the slide, however, by selling the aromatic about 10% below the market average.

Naphthalene (solidifying under 79 C)	lb.					
Denmark		55,942	———	———	1,345	———
United Kingdom		9,851,786	13,396,495	73.5	365,741	411,331
Netherlands		5,449,899	6,730,499	81.0	187,701	229,335
Belgium		16,348,528	16,155,390	101.1	490,438	515,689
France		4,128,358	5,210,908	79.2	120,276	155,451
West Germany		30,165,183	41,073,321	73.4	998,607	1,542,572
Poland		871,703	———	———	28,163	———
Total		66,871,399*	83,336,106*	80.2	2,192,271*	2,881,547*

AMMONIUM SULFATE: Down sharply is the sales story here. In 1954, only 58.2% of 1953's quantity passed Customs. Canada, Belgium and Luxembourg accounted for most of the fertilizer.

Ammonium Sulfate	s.t.					
Canada		156,960	150,374	104.2	7,679,566	7,054,300
Belgium and Luxembourg		91,874	115,636	79.5	4,006,896	4,984,299
West Germany		28,974	150,869	19.2	1,260,760	6,492,422
Austria		10,792			474,920	
Italy		16,412	30,512	53.8	679,936	1,241,142
Total		305,012*	523,828*	58.2	14,102,078*	22,772,920*

* Totals include figures from countries not listed.

TO the hard-pressed chemical sales manager, vainly struggling with the toughest competitive battle in two decades, the final tabulations of 1954's imports can hardly be held encouraging. Anything that knifes into the market is bound to hurt. But yet, a sober analysis of the past year's results can leave no ground for gloom; imports were definitely on the downslide.

Out of the some 40-odd chemicals that *CW* has selected for compilation, 20 declined better than 10% in quantity; six held at about the preceding year's level; and 12 rang up notable gains. Most startling of the drops occurred in magnesium sulfate (to 0.49%), ethyl alcohol (to 13.4%), and acetic acid (to 37.35). Substantial decreases also occurred in glycerine (to 46.5%), benzene (to 60.6%), and carbon tetrachloride (to 4.8%).

The reason for the downturn stems from the furious pace of current European consumption; it is leaving reduced amounts of chemicals available for export and is also bidding prices up in some instances. A total of 15 categories reveal higher average prices compared with 1953. On the other hand prices plummeted in 23 groups and remained the same in three others.

Showing little change over the past year were calcium cyanamid, calcium nitrate, ammonium phosphate (for fertilizer), arsenic trioxide, iodine (crude), and cresylic acid. These chemicals remain within 3% of the 1953 figures.

Upswing: Of the chemicals revealing sharp increases, menthol, argols, sodium nitrate, fish scrap, peat moss, dextrine, antimony oxide, acetanalides, and trichloroethylene were most pronounced. All recorded figures at least 10% over 1953, with trichloroethylene (139%) and sodium nitrate (128%) leading the list.

As yet, *CW*'s figures are unofficial; official U.S. Dept. of Commerce totals will be forthcoming in about two to three weeks. Very likely, they will hold further good news for harassed U.S. sales managers—that other foreign chemical commodities, too, have found more outlets at home than they ever found before.

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DISTRIBUTION

AMMONIUM NITRATE and MIXTURES: Although Canada skidded some 12.2%, it managed to stay ahead of the Netherlands, whose volume stayed essentially constant. U.S. sales for the entire group were only 69.5% of 1953 sales.

Commodity	Unit	Quantity 1954	Quantity 1953	Percent of 1953	Dollar Value 1954	Dollar Value 1953
Ammonium Nitrate and Mixtures	s.t.					
Canada		218,073	249,218	87.8	15,123,040	16,743,526
Netherlands		197,415	202,722	97.4	7,940,387	8,957,809
Belgium and Luxembourg		4,164	36,661	13.3	165,213	1,876,428
West Germany		63,409	200,567	31.7	3,062,305	9,283,411
Austria		5,478	55,018	99.7	207,149	2,113,920
Italy		36,399	10,251	355.	1,397,151	385,519
Total		524,938*	755,087*	69.5	27,895,245*	39,438,733*

ACETANILIDES—Not Medicinal: Spurting a bit, this category finished 11.2% ahead of the 1953 imports. Leading the group was West Germany with a 230% increase, followed by the U. K. with a 128.2% jump.

Acetanilides—not medicinal	lb.					
Canada		13,495	14	96,300	2,205	48
Sweden		1,023			7,801	
Denmark		442			2,791	
United Kingdom		1,071,901	835,520	128.2	367,431	504,916
Netherlands		58,977	36,292	162.2	52,485	10,725
France		26,138	250,000	10.4	33,051	215,004
West Germany		1,136,334	492,656	230.0	1,156,398	932,454
Switzerland		207,117	138,778	149.3	259,773	171,800
Italy		276	6,001	4.62	3,000	12,302
Australia		300			1,095	
Total		2,516,003*	2,259,361*	111.2	1,886,030*	1,847,432*

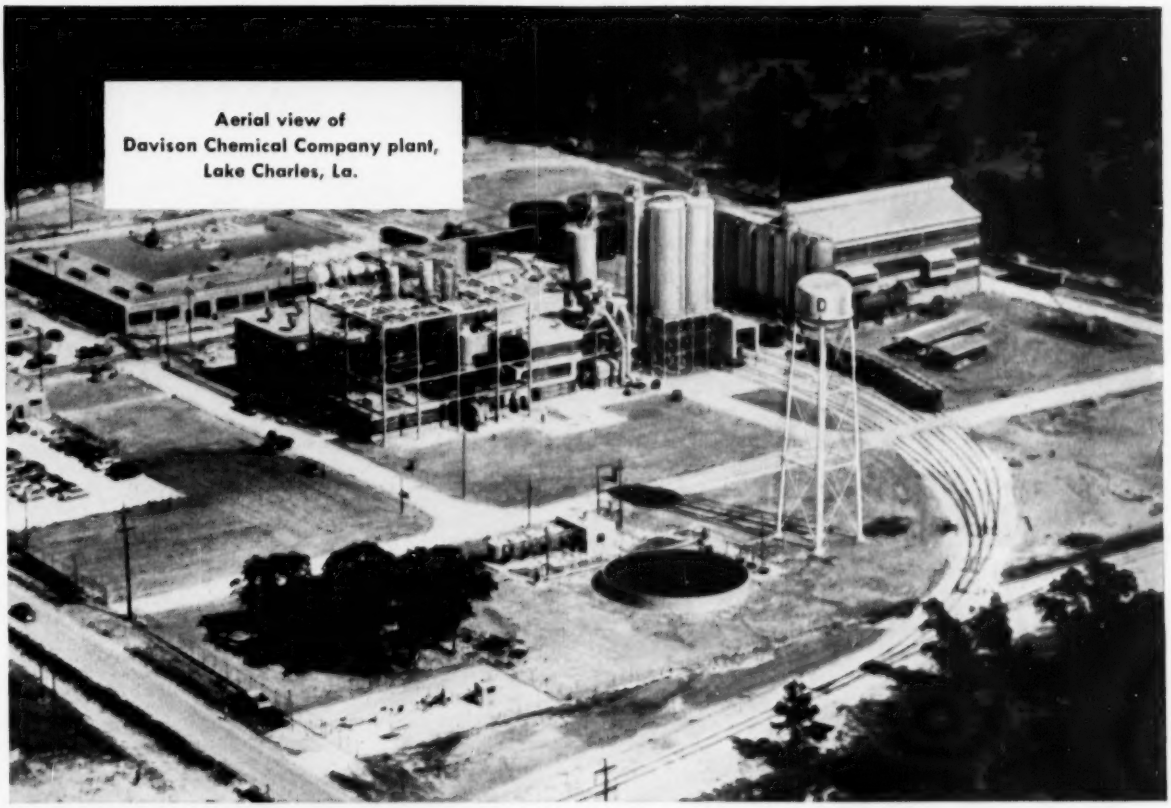
GLYCERINE: Tumbling severely from 1953 levels, glycerine imports accounted for only 46.5% of 1953's 36.5 million lbs. Argentina, the largest supplier in 1953, fell to fourth place last year, well behind the pace-setting Philippine Republic. Price (20.4¢ vs 17.8¢/lb.) was one factor.

Glycerine—crude	lb.					
Canada		547,149	513,797	106.7	127,088	111,367
Mexico		1,700,316	1,780,786	95.6	241,053	292,968
Cuba		2,684,721	3,387,922	79.3	476,038	814,124
Argentina		2,355,460	8,322,541	28.2	477,479	1,991,154
Philippine Rep.		6,181,903	5,567,494	110.8	1,105,466	1,478,260
Guatemala		245,431	291,363	84.3	42,808	40,927
India		2,506,538	5,273,716	47.4	406,385	1,253,103
Australia		23,396			5,749	
Nigeria		448,000	475,131	94.3	88,978	125,756
Uruguay		30,871	605,925	5.1	7,445	157,471
Denmark		44,167	137,392	32.1	8,302	37,617
Japan		220,439			30,608	
Total		16,988,391*	36,543,776*	46.5	3,017,399*	8,791,535*

COLORS, DYES and STAINS—COAL TAR: Switzerland and West Germany continued to dominate this category, having 81% of the total. Showing signs of life, however: the Netherlands (up to 3,060%) and Italy (up to 204%).

Colors, Dyes, and Stains, Coal Tar	lb.					
Cuba		1,000	1,067	93.9	3,200	4,048
Canada		700	2,086	33.5	2,681	4,207
Sweden		661	250	264.0	904	603
Ireland		490,840			566,444	
Netherlands		15,992	522	3,060.	28,552	2,446
Belgium and Luxembourg		1,590	26	6,110.	3,620	780
France		953	10,078	8.85	6,310	27,078
West Germany		715,055	705,455	101.4	1,451,244	1,604,315
Austria		2,200	1	220,000	2,376	13
Switzerland		1,445,158	1,277,572	113.2	5,160,204	3,731,194
Italy		2,441	1,198	203.6	2,202	1,381
Total		2,676,598*	2,580,018*	103.8	7,227,737*	6,202,358*

* Totals include figures from countries not listed.



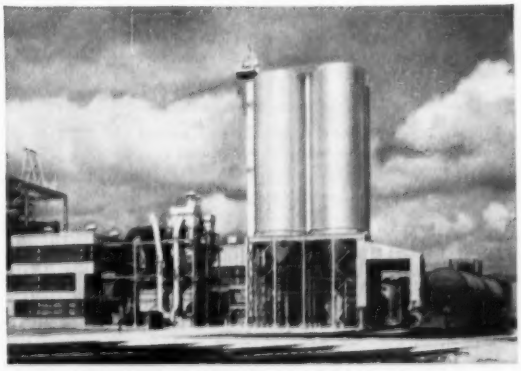
Aerial view of
Davison Chemical Company plant,
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The alumina trihydrate used by Davison is one of several grades of pure aluminum hydroxide manufactured by Reynolds. Commercial, organic-free and low-iron grades are available in a range of particle sizes. For full information call on your nearby Reynolds office listed under "Aluminum" in the classified telephone directory, or write *Reynolds Metals Company, P. O. Box 1800-CM, Louisville, Kentucky.* A free brochure on *Reynolds Aluminum Chemicals* is also available.

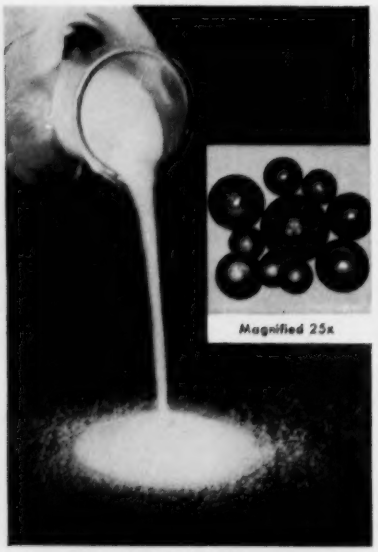


Catalyst manufacturing building showing secondary filtering and water treating area, flash driers and finished product silos.

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Uses for these low-cost Vinac Beads include—

ADHESIVES: Hot melts, heat seal and solvent types quickly bind porous and non-porous materials of all kinds.

COATINGS: Form protective films of great clarity and high gloss on paper, plastics, ceramics and metals. Good water, oil and grease resistance; mild alkali and acid resistance.

INKS: Give body and adhesion to lacquers, paints and inks applied to a variety of surfaces.

Free sample of Vinac Polyvinyl Acetate Beads on request. Also Colton technical assistance, data sheets, suggested formulations. Address Department 29.

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A Division of Air Reduction Co., Inc.

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Sales Offices and Warehouse Facilities also in New York City; Chicago; Elkton, Maryland; Spartanburg; Dallas; Seattle; Portland; San Francisco; Los Angeles.

DISTRIBUTION . . . . . .

TRICHLOROETHYLENE: Stateside demand continued to rise although slowed in pace somewhat from the previous year. With the lure of a 6.26¢/lb. price (average: 8.43¢/lb.), Italy easily outdistanced its nearest rival, Canada (13.1¢/lb.).

Commodity	Unit	Quantity			Dollar Value	
		1954	1953	Percent of 1953	1954	1953
Trichloroethylene	lb.					
United Kingdom		6,333,809	4,660,307	135.6	467,171	344,382
Canada		6,493,255	6,393,948	101.5	854,372	870,512
Netherlands		1,726,317	815,940	21.2	103,404	56,073
West Germany		132,217	488,678	27.1	8,621	34,272
Italy		9,100,465	4,660,578	194.5	570,635	244,205
Total		23,786,063	17,090,328*	139.0	2,004,203	1,563,334

UREA: This chemical, too, followed the general decline. Sales were only 82.9% of 1953 value. The U. K., Netherlands and Belgium, however, ran counter to the trend, with prices well below the average of $103.90/ton.

Urea	s.t.					
Canada		40	14	286	3,864	743
Norway		11,577	12,799	90.5	1,360,610	1,522,321
United Kingdom		37,015	33,566	109.7	3,802,103	3,392,267
Netherlands		1,850	721	256.5	117,216	81,776
Belgium		1,392	906	153.7	148,308	83,631
West Germany		10,965	13,129	83.5	1,127,013	1,404,608
Switzerland		1,899	3,628	52.2	205,746	380,122
Italy		5,597	9,881	56.7	494,020	1,865,668
Japan		2,435	9,406	25.9	307,146	1,083,792
Total		72,770	87,975*	82.9	7,566,026	9,297,336*

POTASSIUM CYANIDE: Offering material at 3.8¢ below the average price of 33.3¢. French producers rang up substantial sales gains. Largest sellers, W. Germany and the U. K. suffered severe drops, making only 66.7% and 44.8%, respectively, of the previous year's sales.

Potassium Cyanide	lb.					
United Kingdom		487,477	1,086,950	44.8	174,257	418,196
Netherlands		26,004	34,009	76.5	8,885	12,123
Belgium		11,023	24,603	44.8	4,030	12,049
France		204,383	154,322	132.2	69,139	60,150
West Germany		920,381	1,378,260	66.7	294,842	485,885
Czechoslovakia		11,011	121,968	9.04	3,278	41,494
Italy		11,023	8,818	125.0	3,613	3,288
Sweden		4,730			1,565	
Total		1,676,032	2,808,930	59.7	559,609	1,033,185

* Totals include figures from countries not listed.

For Tomorrow's Reference: Some of the latest publications.

• Chloromethanes—28-p. booklet contains data on diverse uses and physical and chemical properties of a number of chloromethanes. Solvay Process Division, Allied Chemical & Dye Corp. (New York).

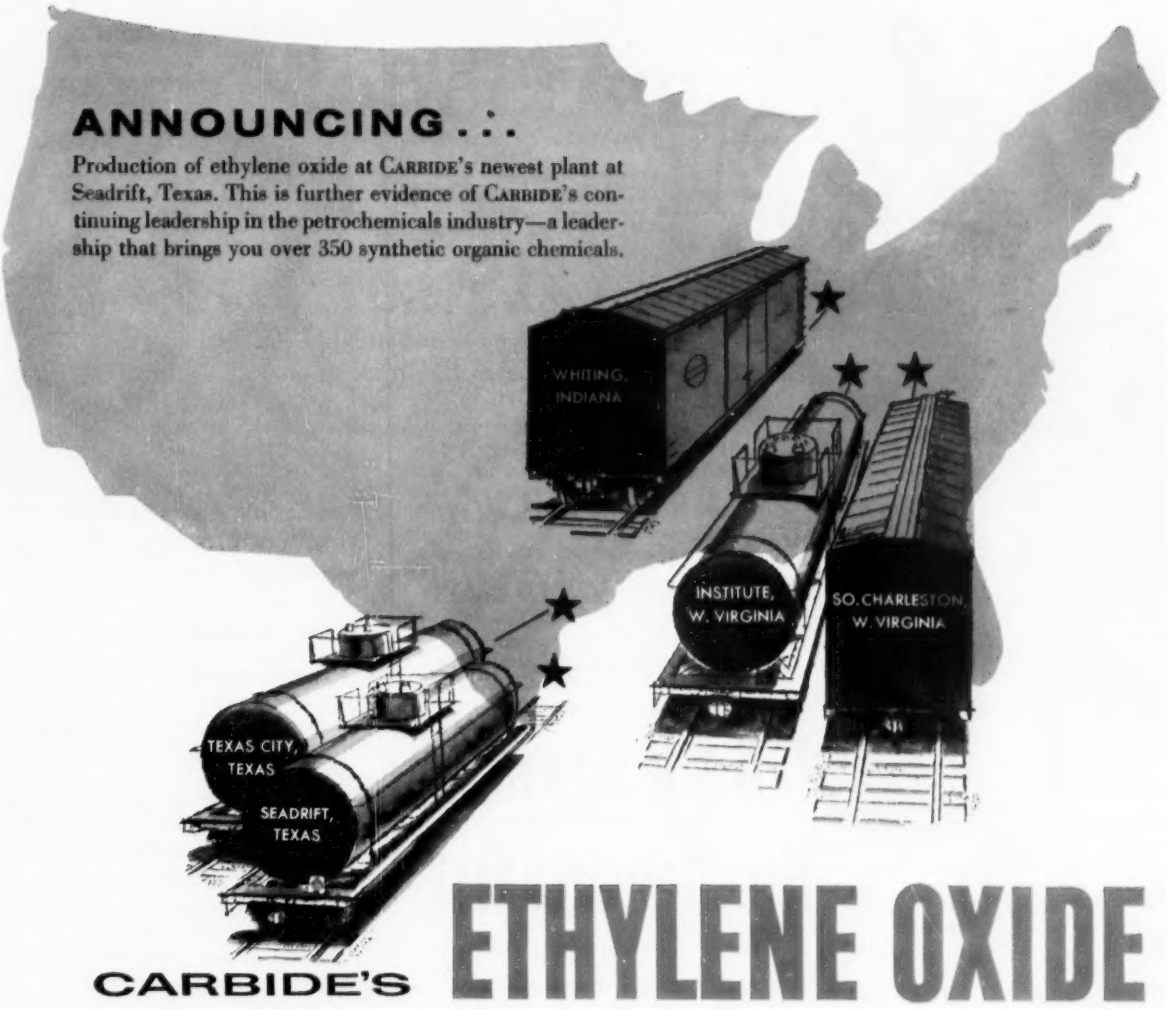
• Armacs—booklet describes characteristics and applications of acetic acid salts of fatty amines. Armour and Co. (Chicago).

• Carbon in Catalysis—Tech. Bulletin No. 20 covers the advantages and requirements of activated carbon as a catalyst or catalyst support. Adsorbite Division of Barnebey-Cheney Co. (Columbus, O.).

• Fatty Alkanolamides—Tech. Bulletin No. 44 describes uses and formulations for this series of products. Emulsol Chemical Corp. (Chicago).

• Soft Water—48-p. volume, "Soft Water in Modern Use," outlines differences between hard and soft waters, methods of softening, and functions of city softening facilities. Price: $2. Water Conditioning Research Council (Chicago).

• Pulp Bleaching—Bulletin No. 66 offers a number of test procedures of preliminary evaluation of various peroxide pulp-bleaching treatments. Becco Chemical Division, Food Machinery & Chemical Corp. (Buffalo, N.Y.).



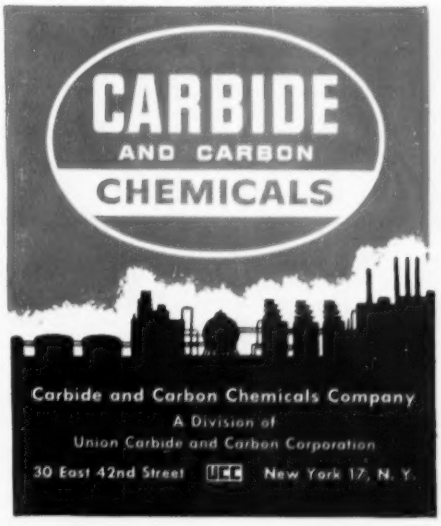
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If you use ethylene oxide, call or write the nearest CARBIDE office for your copy of "Operating Procedures for Handling Ethylene Oxide." Ask for Form 7618. For information on ethers or other oxides, request Form 4764. In Canada: Carbide Chemicals Company, Division of Union Carbide Canada Limited, Toronto.





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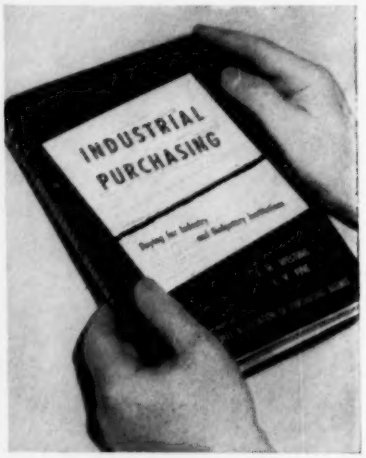
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TEXT BOOK: For industry as well as college.

How to Buy

Purchasing principles, methods, and strategies—vital to the purchasing agent—are also grist for the executive whose activities in any way touch on company buying.

A new college-level text, "Industrial Purchasing," written by J. H. Westing, I. V. Fine, and members of the Milwaukee Assn. of Purchasing Agents, is based on the practices and experiences of many industrial executives.

Topics include departmental organization, buying operations, legal aspects, traffic, performance evaluations, public relations, and related problems. Many basic industrial products commonly handled by purchasing agents are also surveyed; e.g., metals, fuels, chemicals, containers.

In general, the purpose is to explain the responsibilities and methods of the purchasing agent, who must " . . . buy materials of the right quality, in the right quantity, at the right time, at the right price, from the right source, with delivery at the right place."

•

Program for Chemical Buyers: The Chemical and Allied Products Buyer's Group will present a program during the national convention of the National Assn. of Purchasing Agents at the Waldorf-Astoria in New York, May 29 to June 1.

On the May 31 agenda: topics relating to custom chemical requirements, supplier's obligations and Federal Drug Administration requirements, supplier research and technical service, the vendor in technical serv-

Corrosioneering News

Quick facts about the services and equipment Pfaudler offers to help you reduce corrosion and processing cost.

Published by The Pfaudler Co., Rochester, N.Y.

CORROSION GUARANTEE ANNOUNCED!

Now—a year's corrosion guarantee on Pfaudler vessels used in processes containing hydrochloric acid!

If your product has hydrochloric acid as its principal corrosive agent, and you operate in the range represented by the darkest area on our chart, you can now have processing equipment which carries a full year's guarantee against corrosion!

If chemical attack should render your Pfaudler glassed steel equipment unusable within its first year of use under the operating conditions specified in the guarantee, Pfaudler will replace or repair it without charge by on-the-spot methods or on an F.O.B. factory basis.

You receive this guarantee on all glassed steel equipment supplied with Pfaudler acid-alkali-resistant glass, when it is expressly purchased for processing hydrochloric acid in the specified range of conditions. Such equipment includes reaction kettles, stills, receivers, condensers, heat exchangers and storage tanks.

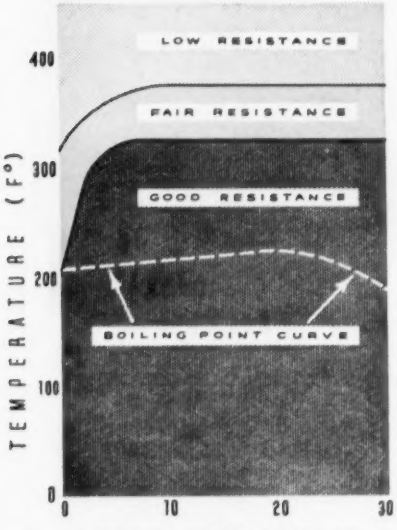
The guarantee, in written form, is delivered with the equipment, and states clearly the operating conditions under which it applies.

You'll find three important advantages in this unique guarantee:

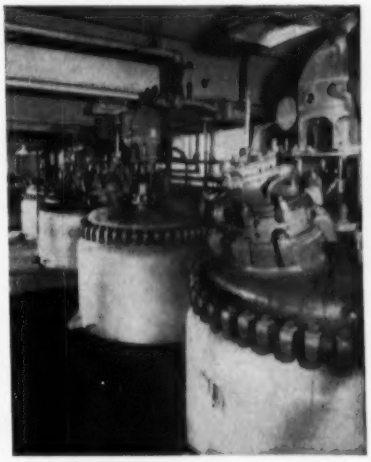
1. It minimizes the possibility of major shutdowns caused by corrosion of equipment.
2. It frees you from large maintenance or replacement costs.
3. It assures you that the glassed steel equipment you buy is *matched to your process*, selected for its special resistance with reference to *your* product.

Perhaps you have a problem right now, for which this guaranteed corrosion-resistant equipment offers a solution. Call in your Pfaudler representative and discuss your needs with him.

Or write for Bulletin 205, "Glassed Steel—Its Resistance to 92 Corrosives, Forms Available and Applications."



Corrosion resistance of Pfaudler acid-alkali-resistant glass by hydrochloric acid. For concentrations and temperatures in darkest area, glassed steel equipment is guaranteed against corrosion. In the "fair resistance" and "low resistance" areas, Pfaudler glassed steel may often be the most resistant material of construction available to you at *reasonable* cost. To make this decision, Pfaudler should be consulted, and tests may be run in either your plant or at the Pfaudler laboratory.



Glassed Steel Long Used For Tough Corrosive Problems

Field data which form the basis for Pfaudler's new guarantee against corrosion has been compiled from thousands of installations, such as these glassed steel reactors in use at Distillation Products Industries. Pfaudler glassed steel units have solved problems of corrosion since 1884, are continually being improved to meet new demands of higher temperatures and pressures.

Three reasons why you can now get this unusual anti-corrosion guarantee

Like all Pfaudler chemical processing equipment, glassed steel *always* has been guaranteed from the standpoint of workmanship.

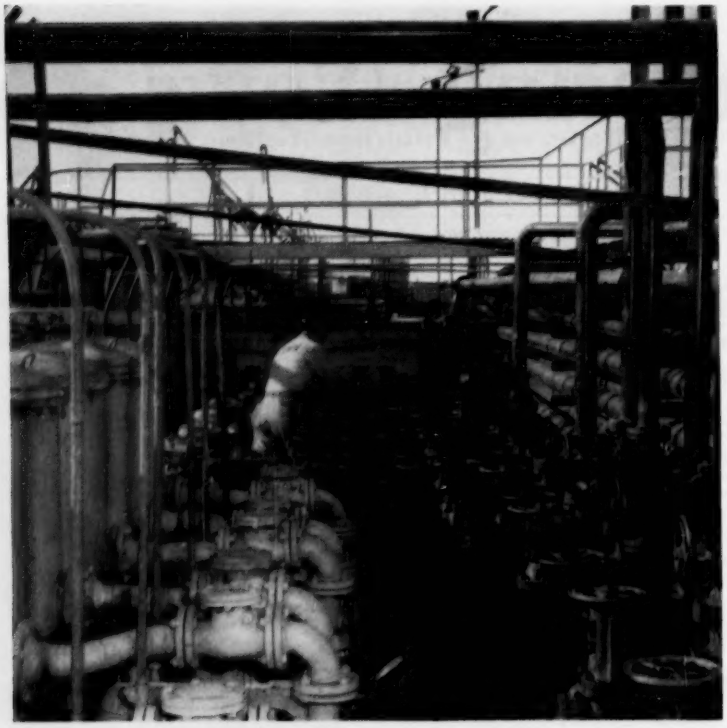
But why is it that you can now get a *corrosion* guarantee—a written agreement that your equipment will hold up under corrosive attack for at least a year?

Reason No. 1 is the glass itself. Pfaudler's new acid-alkali-resistant glass, now standard on chemical processing equipment, is a special type of glass which not only resists most acids, but also can be used for alkalies up to pH 12 and 212° F.

Reason No. 2 is the sensible approach to a specific problem by corrosioneers. We know what glassed steel can do, *and* what it can't. Field and laboratory data provide the background for deciding between glassed steel and other materials.

Reason No. 3 is our general policy on the equipment we sell. During its fabrication, we inspect it carefully at several check points. No vessel for severe chemical service leaves the factory until every square inch inside has been given a spark test to make sure the glass completely covers the steel to a certain minimum thickness.

12-MONTH GUARANTEE against corrosion is now offered with Pfaudler glassed steel equipment for processing a number of specific chemicals; hydrochloric acid, discussed in this article, is one of them. Other products which are covered under this unique guarantee will be discussed in future issues of *Corrosioneering News*. Watch for them.



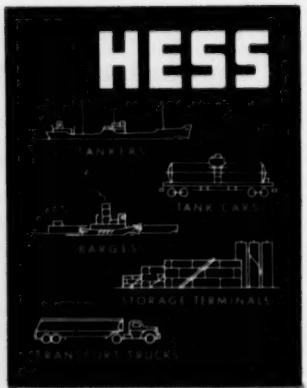
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DISTRIBUTION. . . .

ice, and the supplier's technical contribution.

•

Expanding Sales Coverage: Hoffman-Taff, Inc., producers of vitamins for agricultural and pharmaceutical fields, will open a branch office and warehouse on June 1 in Roselle, N.J. The main plant is in Springfield, Mo., and a branch office and warehouse are maintained in Los Angeles.

• The Chemical Division of General Mills, Inc., will market under the Aliphat brand a major portion of a line of tall-oil fatty acids to be produced by Crosby Chemicals, Inc.

• Geigy Dyestuffs, Division of Geigy Chemical Corp., on May 1 transferred its New England operations to 33 Industrial Place, Newton Upper Falls, Mass. Consolidation of the previous Boston and Providence operations will facilitate technical service and the movement of goods.



Squeeze Barrels

POLYETHYLENE - fabricated, nestable, and equipped with molded-in handles, these 50-liter drums are expected to find application in handling corrosive chemicals. The polyethylene drums, manufactured by Montecatini, an Italian firm, also feature a light tare, two pouring spouts, and a vent-valve. Designed by Pirelli for Montecatini, the barrel, believed to be the first such made, is handled in the U.S. by Chemore Corp. (New York).



Better "dough" for Airfoam* cushions

When rubber latex was made with raw water, the dissolved minerals in the water often coagulated the latex prematurely . . . resulting in excessive waste.

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So they looked for a way to get the equivalent of distilled water, in volume, at low cost . . . and selected PERMUTIT ion exchange resins and equipment.

Here's what Goodyear reports after 4 years of continuous operation: "The PERMUTIT units reduce dissolved solids from 165 to 3 parts per million and supply iron-free water of controlled alkalinity. It has proved to be higher in quality than distilled water—at a considerable saving!"

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ACRYLIC FIBER CONSUMPTION

	Apparel	Home Furnishings	Industrial
ACRILAN (12 million lbs.)	Woven: women's 20-25% men's 10-15% Knitted: women's and men's 45-50%	Blankets upholstery drapery (10-15%)	Work clothing (2%)
DYNEL (4 million lbs.)	Women's: dresses 10-15% skirts, coats, suits 20-25% Men's: suits, sport clothes 3-5% Infants and children 15-20% Knitted underwear 3-5%	Decorative fabrics (5-7%)	Paint roller covers, filter cloth, belting, bags, work clothes (35-40%)
ORLON (40 million lbs.)	Knitted outerwear women's and men's 55-60% Woven: women's 20-25% men's 7-10%	Decorative fabrics (3-5%)	Filtration fabrics, anode bags, cordage (5-10%)

Acrylics Speed into New Outlets

There hasn't been such a surge in man-made fiber sales as the acrylics are enjoying right now since nylon took over women's stockings. That sums up the roseate outlook for synthetics as '55 heads toward midpoint. Acrylic textile fiber production this year will become far and away the chief outlet for acrylonitrile. Output of Orlon, Acrilan, and dynel—the acrylic family—will pre-empt between 65-70 million lbs. of acrylonitrile by the end of the year.* Compare that with the 10 million lbs. estimated consumption by fibers in 1952 (*CW, Feb. 14, '53, p. 59*).

* This is one good reason why B. F. Goodrich Chemical will be turning out acrylonitrile by June of this year. Its supply will be added to that already coming from American Cyanamid, Carbide and Carbon, and Monsanto.

Pacing 1955's swift rise in acrylic fiber production is Du Pont's acrylonitrile polymer fiber, Orlon. The major acrylic producer is running its plant at Camden, S.C., close to capacity, turning out filament, staple and tow at an estimated rate of 40-45 million lbs./year (*see chart*). Word now is that capacity will be expanded during the year to 60 million lbs. going into 1956.



NAPALM BOMBS SCORE HIT ON NORTH KOREAN RAIL TARGET *Defense Dept. Photo*

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Today, Nuodex offers *Standard Stearates*—all the most widely used types for every application. And *Special Purpose Stearates*—made to order to fit particular requirements.

All Nuodex Stearates are made in our own plant with one standard of quality from start to finish. All are based upon our pioneering with metallic soaps—dating back to 1932.

Nuodex also pioneered the policy of *certifying* the quality of every Nuodex product. The resulting uniformity assures optimum performance of finished products. Today, this same policy extends to Nuodex Stearates . . . every package carries the *Uniformity Certified* imprint.

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Jets Prime a Market

VERY LITTLE is being said officially as yet, but by this week it's apparent that the chemical industry has zeroed in on an early *CW* "Target" (*Feb. 21, '53, p. 24*). The hit: a jet-blast-resistant cover (compounded of coal tar and synthetic rubber) for military airfield test and maintenance aprons.

Deterioration of asphaltic concrete pavement (black top) and filler material in joints between slabs of portland cement concrete at airfields is a comparatively recent problem—acute only since the revolutionary switch from propeller- to jet-powered craft.

Both the cement and asphalt concrete surfaces have been used for runways for all types of planes; neither are affected by normal spillage of fast-evaporating high-octane gasoline. Hydrocarbon fuels used in jets, however, evaporate slowly, will remain on the airstrip long enough to dissolve some of the asphalt.

Portland cement generally withstands jet blasts, heat, and fuel spillage satisfactorily, and, when the joints are filled with a special fuel-resistant material, the layout fulfills military requirements ideally—except for the high cost. A portland cement surface, in continental U.S., runs $2.50-$3/sq. yd. higher than asphaltic concrete.

Thus the Air Force search centered on finding a protective covering for the less expensive black top, one that withstands jet buffeting.

U.S. Rubber, among other companies trying to crack the nut, solved the problem of using synthetic rubber as an additive in a hot coal-tar mix—in effect "homogenizing" the mixture. The compound, blended by Reilly Tar & Chemical, working with U.S. Rubber (successful bidder on a recent government contract), consists chiefly (about 87%) of tar. Addition of the oil-resistant rubber (approximately 3%), increases the low-temperature flexibility, high-temperature stability, as well as the oil resistance of the tar-rubber concrete pavement. Despite the small quantity of additive required, enough will be needed to add up to a hefty bit of business for the chemical trade.

The Air Force alone may buy from 50-75 million lbs./year of cementing product for top courses—a possible outlet for some 2 million lbs. Example: the Homestead Air Force Base in Florida is being reactivated, and surfacing with tar-rubber concrete will consume some 14.5 million lbs. of the binder.

Add, too, Navy fields, municipal and commercial airports likely to follow the trend, and the market compounds. Proof that chemical suppliers were justified in taking a bead on a profitable and—more important—widening target.

The chances are good that actual output of Orlon in '55 will tally around 50 million lbs.

Runner-up to Orlon in today's acrylic fiber market is Chemstrand's Acrilan, a polymer of 85% or more acrylonitrile and other constituents. This production year appears to shape as a banner one, promises a total of 12-15 million lbs. of Acrilan from Chemstrand's plant at Decatur, Ala., easily vaulting last year's estimated 3 million lbs.

Trailing well behind the two acrylic leaders, Orlon and Acrilan, is Carbide and Carbon's dynel. In fact, this copolymer of acrylonitrile and vinyl chloride (roughly 40:60 ratio) is just marking time, has lost many customers because of its inherent heat sensitivity, tendency to glaze. Dynel output is now conjectured to be between 4-6 million lbs. Odds are, though, that heavy competition from the other synthetics will hold actual production close to 4 million lbs.

Feeling is that dynel is becoming chiefly an industrial fiber, will not make a recovery in apparel until its fiber composition is fundamentally changed. Side light to Carbide's problems is the fact that land once earmarked for a dynel plant at Spray, N. C., remains fallow.

Petard for Acrylics: A chief primer behind the recent explosive expansion of the Orlon and Acrilan consumer market: high-bulk yarn made with blends of relaxed and unrelaxed fibers. Acceptance of the two synthetics in this form has been dramatically swift in women's and children's sweaters and jerseys, and in knitted fleece coats. It's estimated that 45-50% of Acrilan and 60% of Orlon (*see chart*) now goes into knitted wear. Some say knitted wear may soon be taking 75-80% of available stocks of the latter fiber. The sweater market alone could probably take all of Du Pont's originally announced Orlon capacity of 30 million lbs., but the firm prefers to diversify its outlets.

The decision—and inability at the moment to fulfill all demands for Orlon—turns out to be a boost for Acrilan. Many mills that can't get needed Orlon are acquainting themselves with the newer Acrilan, will likely become steady customers as they adjust operations to its characteristics. Since Orlon is available as both filament and staple, and Acrilan

so far only as staple, applications and sales of Orlon generally outstep those of the latter in most consumer wear.

Acrilan not only is profiting from the Orlon shortage and dynel's shortcomings, but also is successfully invading the blanket market held by wool and wool-rayon blends. Spearheads for the invasion: low-weight bulk, resilience, durability, washability, and freedom from allergies.

When it comes to women's wear, where individuality is at a high premium, it's pretty much an axiom that almost every fiber is used to provide special effects. In the case of acrylics, use of acrylics in women's woven wear is roughly two or three to one over use in men's woven wear (*see chart*).

In men's wear, Orlon and Acrilan are just now becoming popular in topcoats and heavy coats, and will be especially sought in flannel suiting for wrinkle- and soil-resistance. These fibers, too, are already blended variously with rayon, acetate, silk, wool and cotton in summer suits, give a multiplicity of crease-resistant textures.

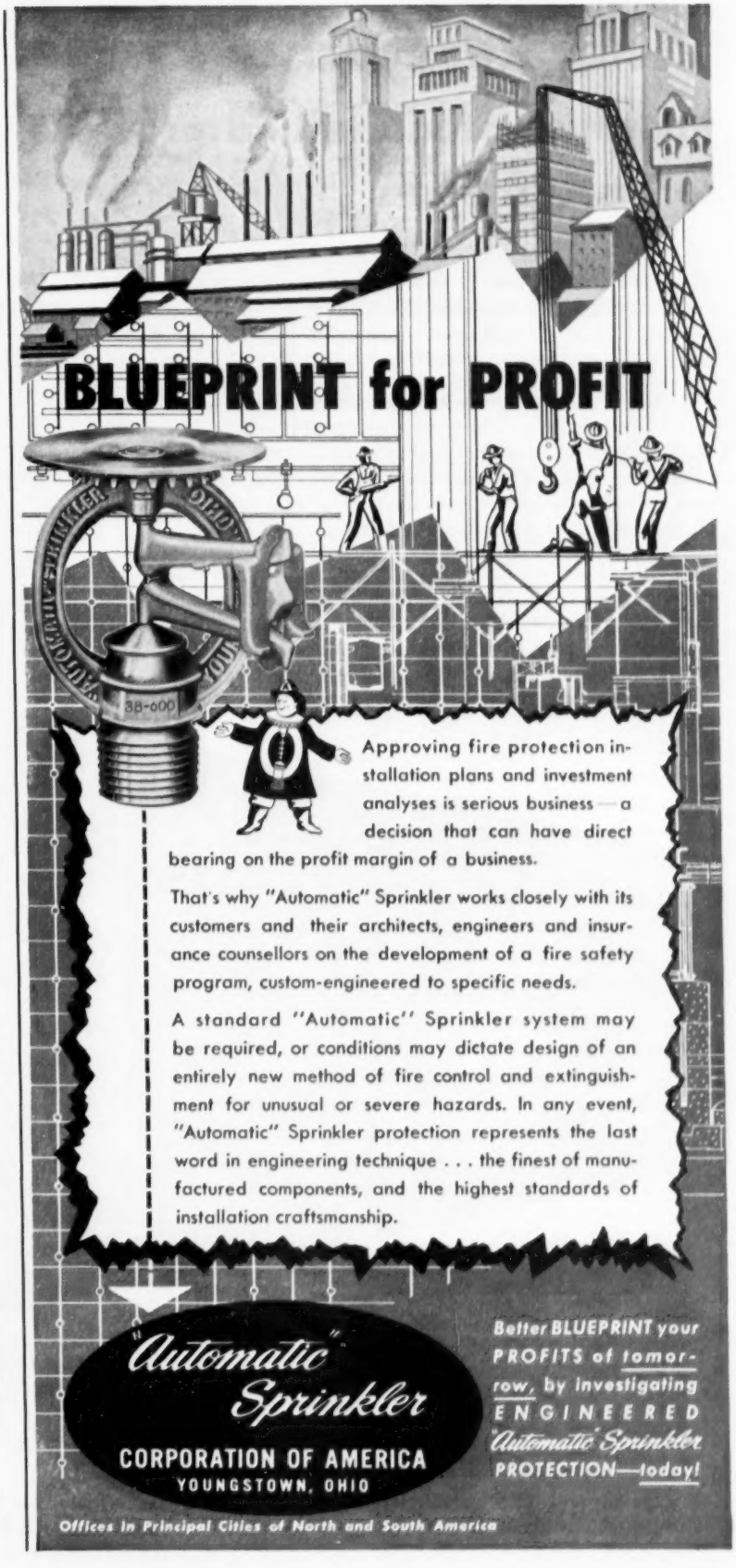
The ground swell for broad-woven acrylic fibers (both 100% and predominantly acrylic blends) began in earnest last year after synthetics' '53 setback. The '54 vs '53 score: 23,186,000 vs 16,777,000 linear yds.

(These figures include use of Orlon and Acrilan, since dynel generally amounts to less than 35-40% of fibers in broad-woven blended goods.)

Industrial Squint: Though apparel makers get the bulk of Orlon and Acrilan today, acrylic fiber producers aren't neglecting industrial outlets. In fact, the acrylics vie with high-tenacity rayon, nylon, Dacron and Fortisan in meeting a flock of industrial requirements—in acid-resistant work clothing, filter cloths, laundry nets, press covers, conveyor belts, tarpaulins, cordage, etc.

For the present, major industrial usage is on the horizon, but the future for the apparel acrylics—and it's a promising one—lies in their ability to replace wool. There's no denying that the acrylics do have sales appeal over wool because of low density and high bulk, as well as low moisture absorption and shape retention.

And these acrylic qualities are the reasons behind this year's surge, next year's soar.



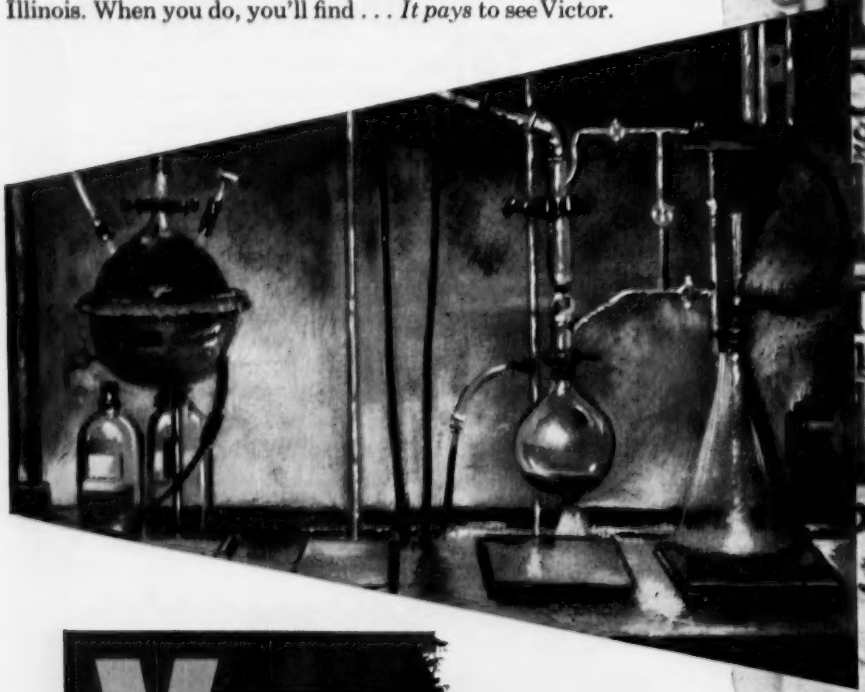
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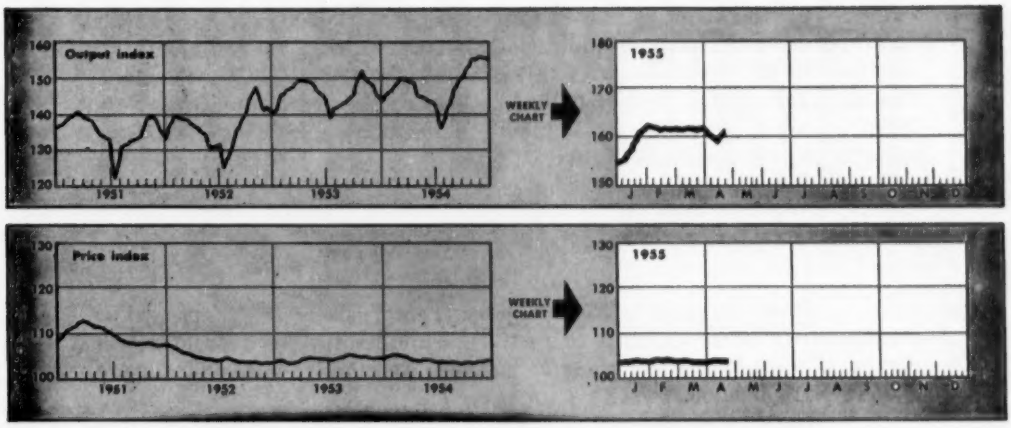


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WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
CHEMICAL WEEK Output Index (1947-49=100)	159.8	161.0	145.1
CHEMICAL WEEK Wholesale Price Index (1947=100)	104.2	104.3	104.3
Stock Price Index of 11 Chemical Companies (Standard & Poor's Corp.)	414.2	399.6	296.3

MONTHLY INDICATORS—Wholesale Prices (Index 1947-1949=100)	Latest Month	Preceding Month	Year Ago
All Commodities (other than Farm and Foods)	115.7	115.6	114.5
Chemicals and Allied Products	107.1	106.8	107.2
Industrial Chemicals	118.0	117.5	117.4

MARKET LETTER

Latest drop in benezene hexachloride (BHC) prices may push some producers into the red on this product. Tags now read: "low grade" (12-15% gamma isomer), $0.006 per gamma unit-pound, down from $0.0075; "high-grade technical" (36-42%), $0.007, down from $0.0085.

Reason given for the latest BHC price slice: cotton insect infestations haven't been very serious in recent years. Fact is, though, that growers don't really know what to expect until June or July.

Some observers feel that Ethyl Corp.'s recent liquidation of BHC inventories sent a tremor through the market, simply because its sales loomed large against dawdling activity.

•

Users of the pyrethrum synergist, piperonyl butoxide, and heliotropin (piperonyl aldehyde), a perfume and medicinal ingredient, are taking a long look at safrol supplies these days. Prices of safrol, raw material in the synthesis of both compounds, may be expected to rise over the next few years.

Reason: principal source, ocotea cymbarum oil, derived from the Brazilian tree, canela sassafraz, is "moving into the hills." Trees around distilleries are being fast-depleted, and long overland haulage is increasing production costs. Costly solutions: to dismantle and relocate distilleries, or build new ones. It takes years for new trees to reach sufficient size. A minor safrol source, Japanese camphor oil, is being consumed in the producing areas.

On the other hand, some big-time users of salt cake have slowed their purchases. That's no indication that the market has gone soft, for business is still quite brisk. The easing now, particularly by the paper industry, merely points up that the hustle-bustle buying of the past several months was at a faster rate than the material could be consumed. Some mills have built up sizable stocks.

There's little concern over inventories, however; the salt cake market being what it is, the current surplus situation could flip-flop shortly as new kraft paper customers come in.

•

Down by nearly 370,000 tons. That's how the Department of Agriculture's latest estimate of fertilizer supplies for the current season compares with a forecast made in late '54. The totals: 6,253,000 tons vs the earlier 6,520,000.

Here's a breakdown of the new estimate: total supplies of nitrogen for fertilizer use will work out to 2,126,000 tons, which includes 1,807,000 tons of domestic production, 2,286,000 tons of phosphorus, including 2,214,000 tons of domestic output; and 1,841,000 tons of potash, of which 1,722,000 will come from U.S. producers.

The USDA report also notes that deliveries this year have again been slower than usual, but the trend in usage toward more concentrated material—mixtures containing higher percentages of nitrogen and potassium, less calcium and sulfur—may bring this season's nitrogen and potash shipments up to last year's despite the smaller tonnage of fertilizer.

•

This week another polyethylene maker joins the crowd. Spencer Chemical's just-dedicated Orange, Tex., plant will add some 45 million lbs./year to the nation's capacity total.

Polyethylene film output potential, too, is soaring. Latest is Durethene's 25% expansion at its Los Angeles and Chicago plants. Booming film demand touched off the increase.

•

How's the aerosol business? The fourth annual ('54) survey shows that 53 packers turned out 169,362,104 units, but the total (including output from some 50 other, non-reporting packers) will likely hit 185 million.

Insecticides are still tops at 43,179,070 units, though down about 4 million from '53. Aerosol shaves spurted a third higher than the previous year, with 42,294,628 units, to grab the No. 2 spot.

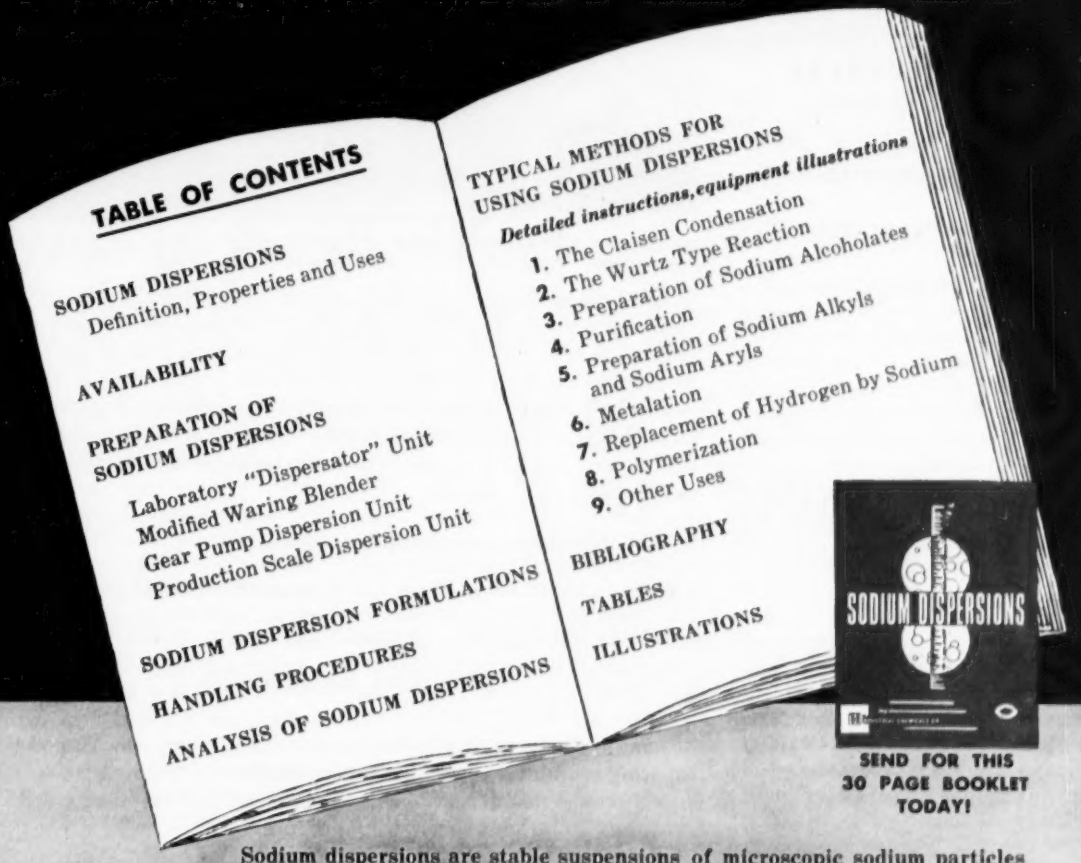
SELECTED CHEMICAL MARKET PRICE CHANGES—Week Ending May 16, 1955

	Change	New Price		Change	New Price
Potassium stannate, dms., frt. alld., E.	$ .004	$ .674	Sodium stannate, dms., wks., frt. alld., E.	.004	.539
Silver cyanide, fib. dms., 2,500-oz. lots, oz.	.125	.7975	Tin metal	.00625	.915
Silver nitrate, CP, cryst., 2,500-oz. lots, oz.	.01625	.57375			

All prices per pound unless quantity is stated.

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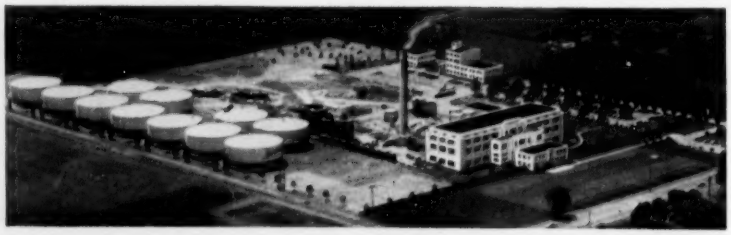
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New NEMA Standards (1952)	182	184	184	213	215	254U	256U	284U	286U	324U	326U
Old NEMA Standards	203	204	224	225	254	284	324	326	364	354	365

*First two digits in frame size equals four times the height (in inches) to centerline of shaft.

Power in Smaller Packages

New plastics and synthetic insulating materials are packing more horsepower per pound, more hours of useful operation into today's electric motors.

Double dividend for the chemical process industry: a growing market for silicones, polyesters; greater return on its motor dollar investment.

Though American industry can look to atomic reactors for help in meeting the ever-increasing demand for electric power, it must still rely on the electric motor to utilize that energy. The chemical process industry with its more than 2 million motors has a bigger stake than most others in the continuing progress and improvement of these machines. And now it is just beginning to reap the harvest of benefits made possible by its own contribution—plastics and synthetic insulations.

Perhaps the most significant recognition of the advantages afforded by the new materials is the rerating program undertaken by the National Electrical Manufacturers Assn. (*CW, July 25, 1953, p. 58*) to update motor frame assignments. Due to be completed in July when the rerated 25- and 30-hp. motors become available, this program marks the first major revision of standards since 1929.

Of course, standards aren't set up to be readily changed. But neither are they intended to preclude advantages offered by technological advances. So with a 25-year accumulation of improvements to draw from, it's small wonder that NEMA decided it was time for a change.

Top Contribution: Though improved mechanical design and better steels have done a lot to boost motor efficiency, the new synthetic insulating materials get the nod as the most important single advance. The team of new magnet wire coatings (*CW, May 14, p. 62*), plastic slot and coil insulation, and synthetic resin impregnants provides stronger, more resistant protection while occupying less space than old-style cotton and paper insulation.

Key space-saving component in the new motors, such as GE's Tri/Clad, Westinghouse's Life-Line-A, is slot insulation of thin Mylar polyester. (Mylar tape, protected by Dacron and hydrocarbon varnish, is also the mainstay of Polyex insulation used on GE's 150-to-3,000-hp. motors.) Applied in both sheet and tape form in combination with rag paper, it has four times the dielectric strength, three to four times the heat endurance of varnished cloth. Add to that the corrosion-, abrasion-, and moisture-resistance of an over-all coating of silicone-modified synthetic varnish and you have the closest thing yet to the long-sought-after "perfect insulation."

But what does this mean to the chemical customer whose prime interest is: Will he be repaid for the inconvenience of redesigning installations, stocking two sets of replacement parts during the transition to the new standards?

For one thing, he'll be getting more horsepower in a smaller package, e.g., 30 hp. in the same frame size formerly required for 15 hp. In many cases, this will permit power input to process equipment to be stepped up without extensive alteration. And in the design of new equipment, fewer pounds per horsepower will mean lighter mounting supports, more compact assemblies.

Another advantage he can count on is more work for the electric power dollar. Thin insulation lets the motor manufacturer use a higher copper-to-steel ratio—and that's what delivers the goods. Closer contact between coils and laminations also increases utilization of the magnetic circuit, reduces iron losses that waste energy as heat.

As a further boost to operating efficiency, the new slot insulations help conduct heat to outside surfaces for faster dissipation. Unlike the earlier cotton-paper insulation, which depended to some extent on trapped air for its dielectric strength, the thin, dense Mylar is not a good thermal insulator. And faster heat dissipation means that the new motors can work harder than older models without exceeding the allowable temperature rise.

Longer Life: From the standpoint of investment dollars, perhaps the principal consideration concerns the equipment's life expectancy. And in this respect, too, the rerated lines are way ahead of their predecessors with old-style insulation.

Partly because of its higher tolerance of heat, and partly because it is subjected to no higher temperature

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than that conservatively set for earlier cotton-paper combinations (NEMA held the line on operating standards), Mylar practically eliminates the chief cause of insulation breakdown—thermal ageing.

Putting it in terms of operating hours, one manufacturer estimates that, under the same conditions, the new type of insulation will stand up for at least 200,000 hours, while the old-style protection would be doing well if it lasted 130,000 hours.

Special Uses: Of course, the chemical industry's contribution isn't limited to the materials used in the 1-to-30-hp. motors affected by NEMA's rerating program. There are many other nonstandard and highly specialized motor applications that could not function efficiently—if at all—were it not for synthetics.

GE, for example, has developed a ¾-hp. pump motor to operate safely while immersed in high-octane gasoline. This type of operation solves many of the problems involved in handling the extremely volatile fuel, but it required considerable design ingenuity. Compact enough to fit inside a 3½-in. pipe, the motor has windings and stator core completely sealed in impervious epoxy resin material for protection.

Another outstanding example of the superiority of synthetic insulation is Allis-Chalmers Mfg. Co.'s (Milwaukee, Wis.) Silco-Flex—the first all-silicone-rubber insulation. Made of Dow Corning's Silastic silicone rubber, it is Class H material for use at temperatures to 180 C.

Like the earlier silicones, which were used chiefly as resin binders for other Class H insulators (glass, mica, asbestos), Silco-Flex has excellent thermal endurance and moisture resistance. But unlike the others, it can be vulcanized into a single continuous dielectric barrier while retaining the flexibility and resilience of natural rubber.

Designed for higher overload capacity, Silco-Flex-insulated motors are said to offer new operational economies in process industry applications where moisture or abrasive dusts are a serious problem.

It's likely that motors will continue pushing toward higher operating extremes. And it's a good bet that the chemical industry will have a lot to do with getting them there.

Drying the Hydrate

Among the highlights of the American Institute of Chemical Engineers' National meeting in Houston last fortnight was a paper by Battelle Memorial Institute's J. W. Clegg, who took the wraps off a process of preparing anhydrous hydrazine from the hydrate. An azeotropic distillation, it's the basis for Olin Mathieson's commercial hydrazine venture in Lake Charles, La. (CW, July 18, '53, p. 42). Manager of chemical engineering research at Battelle, Clegg delivered the paper on behalf of his colleagues, R. Q. Wilson, W. H. Mink and H. P. Munger, covering work sponsored by Mathieson Chemical.

Drying It Up: The production of hydrazine isn't an easy job from any standpoint. Both present producers (Olin Mathieson and Fairmount Chemical) use the Raschig process. In it, either ammonia (Olin Mathieson) or urea (Fairmount) reacts with sodium hypochlorite to form chloramine. On addition of more ammonia, the chloramine reacts in the presence of glue or gelatine* to form hydrazine. But the liquors from the process contain only about 2% of the desired product.

And that's where the Battelle process comes in. The trouble is, at a molal concentration of 58.5% hydrazine, an azeotrope forms. Battelle engineers found, however, that by adding aniline—enough to make up 70% (by weight) of the systems—as much as 70% of the hydrazine can be recovered in the anhydrous form. The aniline that comes off as an aniline-water azeotrope can be separated in a phase separator and recycled. Here's how it works on a small scale:

The process is carried out in three distillation columns. One hundred pounds/hour of a 70% (by weight) hydrazine solution was fed to the first column along with 233 lbs./hour of aniline. About 70% of the water comes off the top as an aniline-water azeotrope. This is separated, the aniline recycled and the water discarded.

The bottoms from the first column contains an 88.6% aqueous hydrazine solution and the remainder of the aniline. In the second column, the aniline is distilled off the top and re-

* Which ties up metal ions that catalyze the unwanted side reaction between chloramine and hydrazine.

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cycled. The bottoms from this column is fed to the third where it's separated into anhydrous hydrazine and the hydrazine-water azeotrope. The azeotrope, of course, can be recycled to the first column.

In this manner, 70% of the hydrazine fed to the system can be recovered in the anhydrous form; the only aniline consumed in the process is the small quantity soluble in the water that's thrown away.

Chemical Competition: The azeotropic distillation isn't the only way to concentrate hydrazine, of course. Fairmount Chemical uses a different approach. It fractionates the weak Raschig liquors to a concentration of 30-65% hydrate, then dehydrates with caustic soda.

And Mathieson itself looked at an alternative process before deciding on the azeotropic distillation. This process revolves around the fact that hydrazine is completely miscible with liquid ammonia, while ammonium sulfate is, to all intents and purposes, insoluble.

In this process, the hydrazine can be removed from the weak synthesis liquor in the form of monohydrazine sulfate by the addition of sulfuric acid. Then, the sulfate is treated with liquid ammonia to yield hydrazine and ammonium sulfate.

The insoluble ammonium sulfate can be separated by filtration, leaving a solution of hydrazine in liquid ammonia. The ammonia can be distilled off easily to give anhydrous hydrazine. Efficiency of the process is high: the literature indicates that up to 90% of the hydrazine produced by the Raschig method can be recovered as the sulfate, and the losses in forming the anhydrous product are negligible.

Mathieson doesn't say that the Battelle-developed process is the one employed at Lake Charles. But it does admit to using an azeotropic distillation there. And in view of that, plus its sponsorship of the work at Battelle, there's little doubt but that it's exploiting the aniline-based separation, with modifications necessary to adapt it to equipment for commercial production.

So despite the high efficiency of the sulfate process and the fact that anhydrous hydrazine is produced without recycle, the economies must weigh heavily in favor of the purely physical separation.



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PROCESSES

Sulfide Switch: The Girdler Co.'s (Louisville, Ky.) new process of generating hydrogen sulfide probably doesn't make much sense to chemical operators plagued with the problem of disposing of this noxious product. But for Sherritt Gordon Mines Ltd. (Fort Saskatchewan, Alberta, Canada) this unusual process about-face was the answer to a critical shortage of sulfide needed for precipitating by-product copper and cobalt from nickel-leaching operations.

Well-suited to metallurgical and other uses where hydrogen is readily available, the process comprises the continuous reaction of hydrogen with sulfur at high temperature and pressure. A specially designed reactor, charged with solid sulfur and a steady flow of hydrogen at 80 psig., delivers sulfide continuously at 70 psig. Conversion is said to be close to 100% on a sulfur basis, 95%-plus for hydrogen.

●

Titanium: Responding to the challenge of finding better and cheaper ways of processing titanium, the process industries have scored these gains:

• Westinghouse patented a method (U.S. 2,707,679)—adaptable to zirconium as well as titanium—of producing a metal of high purity and softness. Essentially, it's a two-step reduction of the metal oxide, using a metal like magnesium in the first step and calcium in the second. The product from the process is leached, washed and dried, and the final powder is formed into shapes by pressing, sintering or melting.

• Horizons Titanium Corp. snared three patents covering some of its work on the electrolysis of titanium. The first (U.S. 2,707,168) deals with the electrolytic preparation of titanium monoxide from the dioxide. The second (U.S. 2,707,169) covers a process of making titanium metal by electrolytically decomposing the monoxide. The third (U.S. 2,707,170) covers the same area, generally, as the second, but specifies modifications that result in the electrodeposition of a



High-Pressure Puff Fights Flames

CARBON DIOXIDE is both power source and extinguishing agent of a new fire-fighting system engineered by Walter Kidde & Co., Inc. (New York). This latest addition to the ranks of automatic protection devices (*CW, May 14, p. 104*) is pressure-operated, employs a gas-filled rate-of-temperature-rise detector to trigger release of carbon dioxide under 850 psi. pressure. Other features: pressure-boosting manifold supply, high-volume discharge of special Multijet nozzles.

coarse, crystalline material.

• And attesting to various improvements in the basic commercial processes of making titanium is a new grade of titanium being offered by Du Pont. Grade NDA, it comes in two forms: pellets (at $1.75/lb.) and fines (at $1.50/lb.). Though the metal is nonductile, the new grade is said to be suitable for use as an addition agent in the manufacture of alloys. It's formed as a by-product of Du Pont's commercial sponge production.

• After over a year of development work, American Silver Co. (Flushing, N.Y.) now reports it will soon be rolling titanium foil 0.0005 in. thick. It has been rolling it commercially 0.0008 in. thick.

•

Cobalt Eye: The largest allocation of radioactive cobalt 60 ever authorized to industry will provide the "seeing" power for Babcock & Wilcox Co.'s (New York) Isoscope. Capable of "looking through" steel up to 7 in. thick, this radiographic inspection tool is said to require two-thirds less exposure time than a 1-million volt X-ray machine.

The cobalt 60 charge—1,008 curies worth—consists of small discs stacked in a steel-encased lead sphere. Rotating the sphere 180 degrees brings the radioactive source from its "safe" position to a coned opening in the steel jacket. Mounted on a modified electric platform truck, the unit can be raised or lowered 8 ft., rotated vertically and horizontally.

Relatively low initial cost, simpler shielding, and greater mobility of the Isoscope, says B&W, make it a worthy competitor for high-voltage X rays to reckon with.

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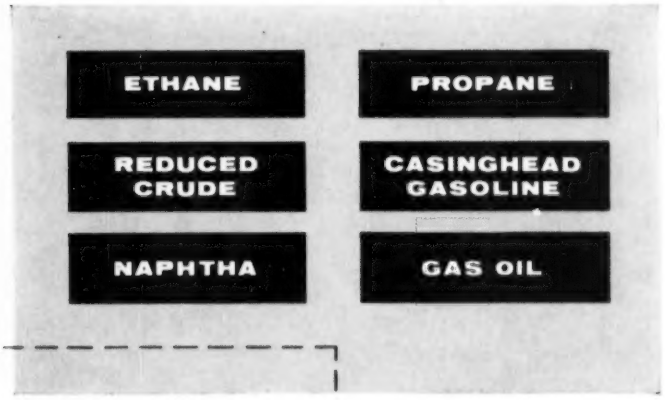
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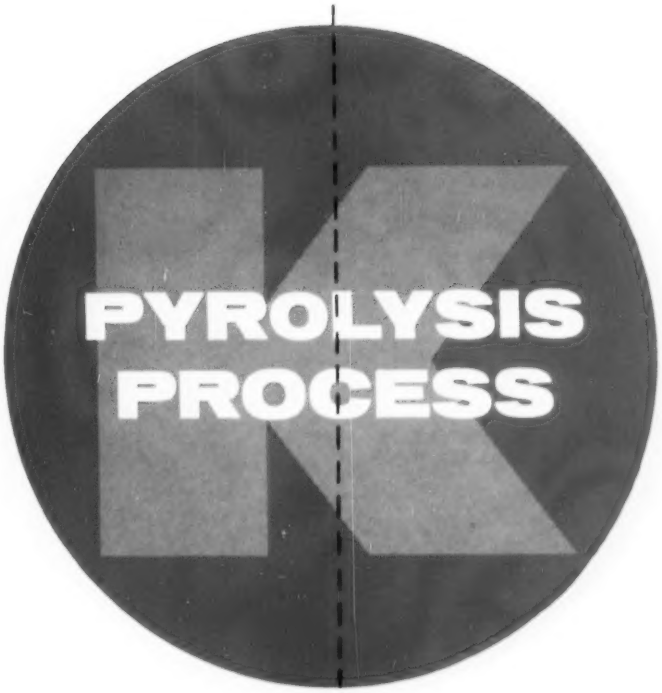
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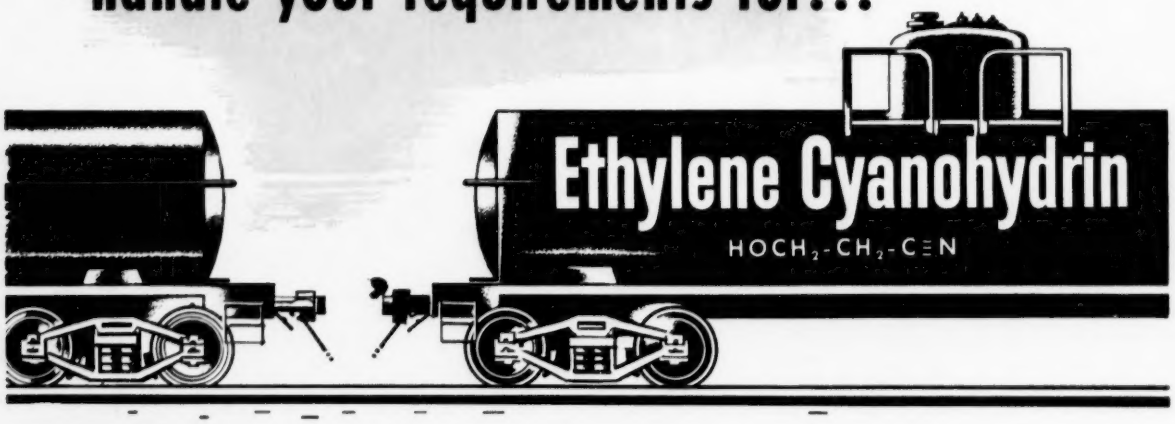
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